FOR THE MEMBERS OF THE NATIONAL WAR LABOR BOARD

MEMORANDUM

ON THE

EIGHT-HOUR WORKING DAY

SUBMITTED BY THE SECRETARY, JULY 20, 1918

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[1] Compiled under the direction of Leifur Magnusson, United States Bureau of Labor Statistics. The Commissioner of Labor Statistics generously detailed several members of the staff of the Bureau of Labor Statistics to assist in the work. Maj. F. J. Rosensohn of the War Department furnished the basic material for the part on the Federal eight-hour law.

THE EIGHT-HOUR WORKING DAY.

PART I.

RECENT APPLICATION OF THE EIGHT-HOUR DAY.

SUMMARY.[1]

During the war period past movements for shorter hours have continued and have been greatly accelerated by the fact that Government contracts have required the eight-hour day. The actual eight-hour day has regularly been waived and overtime work required at increased compensation. The eight-hour movement gained headway before the United States entered the war. As an instance of this fact may be cited the movement for the reduction of hours in the machine trades, which began late in 1915 and continued in 1916. Before our entry into the war, railroad employees secured the so-called basic eight-hour day and the anthracite-coal agreement was also signed before that time.

Industries which as a whole have gone on an eight-hour day with additional pay for overtime are contained in the following tabulation. This does not contain industries in which numbers of wage earners have secured a reduction in hours to eight from time to time as a result of sporadic agreements affecting only small numbers in certain localities. The number of wage earners who have secured shorter hours in that manner is contained in the summary table immediately following this tabulation. During 1917 and the first six months of 1918 about 926,000 workers have gone on an eight-hour day basis.

[1] Further details are given in Appendix A.

INDUSTRIES WHICH HAVE GONE ON AN ACTUAL OR BASIC EIGHT-HOUR DAY SINCE THE ENTRY OF THE UNITED STATES INTO THE WAR.

Industry.	Date.	How accomplished.	Number affected.	
			Establishments.	Employees.
Shipyards	Various dates.	Labor Adjustment Board		133,000
Slaughtering and meat packing.	May 1, 1918	Federal arbitration award		100,000
Garment trades	1917	Collective agreements		178,000
News-print paper industry.	July 1, 1918	Award National War Labor Board.	19	[1]
Government construction work.	June 19, 1917	Agreement between the Secretary of War and the president of the American Federation of Labor.		[2] 108,463
Harness and saddlery industry (so far as engaged on Government work).	Aug. 3, 1917	Executive order	100 manufacturers signed agreement.	[1]
Lumber and saw mills of Washington, Oregon, and California.	Mar. 1, 1918, and later.	Action of employers and advice of Aircraft Production Board.	Unknown	50,000

[1] Unknown.
[2] This number not included in table below, as the trades and occupations affected are not known.

All Government contract work, by act of 1912 and Executive order of May, 1917. Because of the possibility of different interpretations of the law, no statement as to the number of industries included or the number of employees affected can be made.

NUMBER OF EMPLOYEES REPORTED AS HAVING WORKDAY REDUCED TO 8 HOURS IN 1915, 1916, 1917, AND THE FIRST SIX MONTHS OF 1918, BY INDUSTRIES.

	1915	1916	1917, Jan.–June.	1917, July–Dec.	1918, Jan.–June.	Total.
Aluminum manufacturing		275				275
Bakers		1,471				1,471
Boots and shoes		24,000				24,000
Bottlers and brewers	40	560	100			700
Brass workers	2,060					2,060
Building trades		28,676	610		1,800	31,086
Carriages and automobiles	31,085		1,000			32,085
Cement and concrete	45					45
Chemicals	46	82				128
Clerks, store			2,000		1,500	3,500
Cooperage		13				13
Electrical supplies	3,941	852			4,000	8,793
Electric and gas lighting				1,500		1,500
Food and tobacco	300					300
Foundry and machine shops	88,300	19,336	3,185	2,453	816	114,090
Furniture		314	40			354
Garment workers	11,750	67,625	96,600	2,035		178,010
Glass workers					100	100
Hotel and restaurant workers		125				125
Iron and steel			300			300
Jewelry		3,000				3,000
Laundry	35					35
Leather workers				4,600		4,600
Lumber		66	1,875	1,620	50,000	53,561
Metal polishers			500			500
Mining		184,000	2,000	24,000	4,000	214,000
Municipal and State employees		4				4
Munitions	18,000	6,000				24,000
Musical instruments	7,500	54				7,554
Oil workers	7,180	350	300		10,000	17,830
Paper manufacturing		485	2,500			2,985
Packers				300	106,000	106,300
Plated ware	1,134					1,134
Policemen			102		31	133
Printing and publishing					6,600	6,600
Railroads		1,300	400,400	28,500	2,000	432,200
Rubber goods	192	1,500				1,692
Ship and boat building	120	1,250			133,000	134,370
Telephone and telegraph				25,000	2,300	27,300
Textile workers	250				324	574
Window cleaners		800	75	1,200		2,075
Miscellaneous			1,000		150	1,150
Total	171,978	342,138	512,587	91,208	322,621	1,440,532

The recent eight-hour movement began with the railroad brotherhoods in 1916–17. As a result of a threatened strike certain adjustments were made in pay on the basis of an 8-hour day instead of a former 10-hour day. This change was secured by the Adamson law of September 3, 1916. The new day has been termed by the railroad world the basic eight-hour day. This change in the railroad day has affected approximately 400,000 workers.

The eight-hour day has been in force in the Government navy yards for many years, and time and a half has been paid for overtime work. The Federal Bureau of Engraving and Printing, where mostly women are employed, has always been an actual eight-hour establishment, but in periods of rush increased hours have regularly been worked. Only recently was the eight-hour day introduced with time and a half paid for overtime. This has affected approximately 6,600 employees in the bureau.

The eight-hour day has now become almost universal in the shipyards, in which approximately 133,000 employees are engaged.

Coal mining has very largely been an eight-hour industry, at least in the organized bituminous coal fields. The anthracite coal fields had since 1903 operated on a nine-hour basis, but in 1916, by agreement, the eight-hour day was accepted. This now affects at least 180,000 employees.

The slaughtering and meat-packing industry has always been classed as a 10-hour industry. Beginning May 1, 1918, it became a basic eight-hour industry by an arbitration award handed down by a Federal arbitrator. This award has affected, roughly, 100,000 workmen.

The machine trades, beginning in 1915, witnessed a rapid movement for the reduction of hours, chiefly firms having Government contracts, though not exclusively restricted to such plants. Roughly speaking, this movement now affects 116,000 workers.

Another group of workers who have benefited recently by the eight-hour day are the garment workers. Large numbers of these during the latter half of 1916 and the first half of the year 1917 secured by agreement the eight-hour day. Approximately 178,000 garment workers now have a prevailing eight-hour day. This is an industry which has usually been considered a nine-hour or more industry.

Lastly, there may be instanced the placing of the news-print paper industry upon an eight-hour day, with time and a half for overtime, accomplished by an award of the National War Labor Board. This award affects 19 establishments in the news-print paper mills of the United States.

PART II.

APPLICATION OF THE FEDERAL EIGHT-HOUR LAW IN WAR TIME.

While the provisions of the Federal eight-hour law have regularly been suspended during the war, it has been done with the understanding that such suspension is temporary and that overtime of time and a half is to be paid for all work beyond the eight hours per day. The act of 1912, provisions of appropriation acts, and presidential orders under authority conferred by Congress are here reproduced in full. There are also reprinted the suggestions of the War Department for the administration of the act, and the report of the special committee of the War Labor Policies Board of the Department of Labor appointed to investigate the general application of the act.

FEDERAL EIGHT-HOUR LAW, 1912.

The eight-hour law, approved June 19, 1912, is as follows:

AN ACT Limiting the hours of daily service of laborers and mechanics employed upon work done for the United States, or for any Territory, or for the District of Columbia, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of Ameriea in Congress assembled, That every contract hereafter made to which the United States, any Territory, or the District of Columbia is a party, and every such contract made for or on behalf of the United States, or any Territory, or said District, which may require or involve the employment of laborers or mechanics shall contain a provision that no laborer or mechanic doing any part of the work contemplated by the contract, in the employ of the contractor or any subcontractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight hours in any one calendar day upon such work; and every such contract shall stipulate a penalty for each violation of such provision in such contract of $5 for each laborer or mechanic for every calendar day in which he shall be required or permitted to labor more than eight hours upon said work; and any officer or person designated as inspector of the work to be performed under any such contract, or to aid in enforcing the fulfillment thereof, shall, upon observation or investigation, forthwith report to the proper officer of the United States, or of any Territory, or of the District of Columbia, all violations of the provisions of this act directed to be made in every such contract, together with the name of each laborer or mechanic who has been required or permitted to labor in

violation of such stipulation and the day of such violation, and the amount of the penalties imposed according to the stipulation in any such contract shall be directed to be withheld for the use and benefit of the United States, the District of Columbia, or the Territory contracting by the officer or person whose duty it shall be to approve the payment of the moneys due under such contract, whether the violation of the provisions of such contract is by the contractor or any subcontractor. Any contractor or subcontractor aggrieved by the withholding of any penalty as hereinbefore provided shall have the right within six months hereafter to appeal to the head of the department making the contract on behalf of the United States or the Territory, and in the case of a contract made by the District of Columbia to the commissioners thereof, who shall have power to review the action imposing the penalty, and in all such appeals from such final order whereby a contractor or subcontractor may be aggrieved by the imposition of the penalty hereinbefore provided such contractor or subcontractor may within six months after decision by such head of a department or the Commissioners of the District of Columbia file a claim in the Court of Claims, which shall have jurisdiction to hear and decide the matter in like manner as in other cases before said court.

SEC. 2. That nothing in this act shall apply to contracts for transportation by land or water, or for the transmission of intelligence, or for the purchase of supplies by the Government, whether manufactured to conform to particular specifications or not, or for such materials or articles as may usually be bought in open market, except armor and armor plate, whether made to conform to particular specifications or not, or to the construction or repair of levees or revetments necessary for protection against floods or overflows on the navigable waters of the United States: *Provided*, That all classes of work which have been, are now, or may hereafter be performed by the Government shall, when done by contract, by individuals, firms, or corporations for on or behalf of the United States or any of the Territories or the District of Columbia, be performed in accordance with the terms and provisions of section one of this act. The President, by Executive order, may waive the provisions and stipulations in this act as to any specific contract or contracts during time of war or a time when war is imminent, and until January first, nineteen hundred and fifteen, as to any contract or contracts entered into in connection with the construction of the Isthmian Canal. No penalties shall be imposed for any violation of such provision in such contract due to any extraordinary events or conditions of manufacture, or to any emergency caused by fire, famine, or flood, by danger to life or to property, or by other extraordinary event or condition on account of which the President shall subsequently declare the violation to have been excusable. Nothing in this act shall be construed to repeal or modify the act entitled "An act relating to the limitation of the hours of daily service of laborers and mechanics employed upon the public works of the United States and of the District of Columbia," being chapter three hundred and fifty-two of the laws of the Fifty-second Congress, approved August first, eighteen hundred and ninety-two, as modified by the acts of Congress approved February twenty-seventh, nineteen hundred and six, and June thirtieth, nineteen hundred and six, or apply to contracts which have been or may be entered into under the provisions of appropriation acts approved prior to the passage of this act.

SEC. 3. That this act shall become effective and be in force on and after January first, nineteen hundred and thirteen.

Approved June 19, 1912.

NAVAL APPROPRIATION ACT, 1917.

The naval appropriation act approved March 4, 1917, contains this pertinent proviso:

That in case of national emergency the President is authorized to suspend provisions of law prohibiting more than eight hours of labor in any one day of persons engaged upon work covered by contracts with the United States.

Provided further, That the wages of persons employed upon such contracts shall be computed upon a basic day rate of eight hours' work, with overtime rates to be paid for at not less than time and one-half for all hours worked in excess of eight hours.

SUSPENSION OF FEDERAL EIGHT-HOUR LAWS.

EXECUTIVE ORDER.

Under authority contained in the naval appropriation act approved March 4, 1917 (Public, No. 391, 64th Cong.), whereby it is provided—

"That in case of national emergency the President is authorized to suspend provisions of law prohibiting more than eight hours labor in any one day of persons engaged upon work covered by contracts with the United States: *Provided further*, That the wages of persons employed upon such contracts shall be computed on a basic day rate of eight hours work with overtime rates to be paid for at not less than time and one-half for all hours work in excess of eight hours;" it is hereby ordered that the provisions of the act approved June 19, 1912, limiting the hours of daily service of mechanics and laborers on work under contracts to which the United States is a party are suspended with respect to all contracts for ordnance and ordnance stores and other military supplies and material, contracts for building under construction or to be constructed at the arsenals, and contracts for fortification work during the pending emergency and until further orders. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *24th March, 1917*.

EXECUTIVE ORDER.

Under authority contained in the naval appropriation act approved March 4, 1917 (Public, No. 391, 64th Cong.), it is hereby ordered that the provisions of the eight-hour act of June 19, 1912, are suspended with respect to persons engaged upon work covered by contracts with the United States, made under the War Department, for the construction of any military building or for any public work which, in the judgment of the Secretary of War, is important for purposes of national defense in addition to the classes of contracts enumerated in Executive order of March 24, 1917.

It is further declared that the current status of war constitutes an "extraordinary emergency" within the meaning of that term as used in the eight-hour act of March 3, 1913 (37 Stat., 726), and that laborers and mechanics employed on work of the character set forth above, whether employed by Government contractors or by agents of the Government, may, when regarded by the Secretary of War as necessary for purposes of national defense, be required to work in excess of eight hours per day, and wages to be computed in accordance with the proviso in the said act of March 4, 1917.

This order shall take effect from and after this date and shall be operative during the pending emergency or until further orders.

WOODROW WILSON.

THE WHITE HOUSE, *28th April, 1917.*

SUGGESTIONS FOR THE ADMINISTRATION OF THE EIGHT-HOUR LAW.

(War Department.)

INTRODUCTORY.

The following information and suggestions for the interpretation, administration, and enforcement of the eight-hour law. approved June 19, 1912, the naval appropriation act proviso, approved March 4, 1917, and the Executive order of the President dated March 24, 1917, is published, in pursuance of the request of the Secretary of War, for the assistance of all officials and agencies engaged in making contracts or purchases for the War Department or in inspecting work being done or materials being made under such contracts or purchases.

The problems arising under the eight-hour law have been intensified and multiplied by the Executive order of the President suspending the provisions of the law, and thereby bringing into operation the naval appropriation act proviso which requires that wages of persons employed on contracts of the sort formerly within the eight-hour limitation shall be computed on a basic date rate of eight hours, with overtime rates at not less than time and one-half for all hours in excess of eight hours. Thus, in addition to questions formerly arising concerning what contracts fall within the statute, there are new problems relating to the meaning of the requirement of overtime pay and the enforcement of the same.

The great increase in contracts and purchases incident to the present war conditions has made numerous decisions on specific eight-hour questions necessary, and that at a time when pressure of business often interferes with their adequate consideration by the purchasing officers without assistance.

To deal with the problems thus arising the Secretary of War has issued the following order:

In order to settle conflicts and to avoid confusion and delay it has become necessary to secure better administration and enforcement by the War Depart-

ment of the provisions of law requiring time and a half for overtime work under certain classes of Government contracts.

To accomplish this end I have detailed Mr. Felix Frankfurter. It will be his duty:

1. To keep informed as to every phase of the administration of the laws dealing with the eight-hour limitation and time and a half for overtime work.

2. To advise as to these laws any officer or agency of the department engaged in making contracts or purchases.

3. To make rulings, in cooperation with the Judge Advocate General, on any matter which is part of the administration or enforcement of these. Specifically—

(1) What contracts are affected by the laws above mentioned;

(2) The interpretation to be placed upon any of the provisions of these laws;

(3) The methods of securing the enforcement of these laws.

The existing contract-making agencies will retain the powers they now have subject to the control above outlined. It is expected that the necessary betterment in administration and enforcement will largely result from the cooperation of the contracting, purchasing, and inspecting officials of the department with Mr. Frankfurter in the exercise of the advisory powers with which he is charged.

A copy of the foregoing should be read by every official and agency making contracts or purchases for the War Department and by the chief or other head of every inspection division or branch making inspections for the department under any of the said contracts or purchases.

NEWTON D. BAKER.

This pamphlet is issued in an attempt to make uniform and accurate the administration of the law in the various purchasing and contracting bureaus of the War Department. The material of which it is composed is based in large part upon past rulings and the formulated experience of the department.[1]

In carrying out the order of the Secretary an endeavor will also be made to be ready to give in specific cases any information, advice, or recommendation that may be needed; and to this end the cooperation of all contracting and purchasing officers is desired, both in furnishing information and in submitting eight-hour questions upon which aid may be required. Of course, the present officers will continue in their administration and enforcement of the law in the great majority of cases. Opinions and determinations in accordance with the Secretary's order will be offered only in those exceptional instances in which it may seem necessary, upon the request of a contracting officer or otherwise, in order to obviate conflicting or inadequate decisions.

[1] The formulation of this pamphlet has been the work of Mr. Julius H. Amberg, of the Grand Rapids bar.

THE PROVISIONS OF LAW.

(*a*) The law governing eight-hour administration depends upon acts of Congress and an Executive order of the President. The original enactment extending the eight-hour day previously enjoyed by persons employed directly by the Government to those engaged upon Government contracts in general is that of June 19, 1912. This statute provided that a stipulation should be inserted in every contract prohibiting the employment of any laborer or mechanic for more than eight hours in any one calendar day upon the work contemplated by the contract. The act set forth fully a method of enforcement of its provisions, and also excepted therefrom certain contracts enumerated in section 2 thereof.

This eight-hour law of June 19, 1912, also provided that the President by Executive order might waive the provisions of the law during time of war. But this was limited to a great extent by a proviso contained in the naval appropriation act approved March 4, 1917. Although the power of the President to suspend the provisions of the eight-hour law was retained, it was provided that in the event of such suspension the wages of persons employed upon Government contracts should be computed upon a basic day rate of eight hours, with time and one-half for all hours in excess of eight hours.

This naval act proviso was brought into operation by the Executive order of the President dated March 24, 1917, which suspended the provisions of the act of June 19, 1912.

The full text of the eight-hour law, the naval appropriation act proviso, and the President's Executive order appears in the appendix.

(*b*) The eight-hour law, approved August 1, 1892, as amended, is expressly said not to be repealed by the act of June 19, 1912, and also falls within the scope of the above order of the Secretary. But as the former act provides an eight-hour limitation solely as to laborers and mechanics directly employed by the Government or by any contractor or subcontractor upon any of the public works of the United States, its provisions are not so difficult of interpretation and its consideration is not within the scope of this pamphlet.

CONTRACTS IN GENERAL COVERED BY THE LAW.

(*a*) The coming into operation of the naval act proviso has not altered the scope of the eight-hour law of June 19, 1912, in so far as it prescribed the sort of contracts covered and the mechanics and laborers included within its provisions. The same contracts, laborers, and mechanics come within the naval act proviso, the only change

being that the present law, instead of limiting work to eight hours a day, permits work beyond eight hours, but in cases subject to the prior limitation provides for the rate of pay for time in excess of eight hours. Therefore the words of the act of June 19, 1912, must be referred to in reaching a conclusion upon the scope of the naval act proviso.

(*b*) It will be noted that the eight-hour law of June 19, 1912, and therefore the naval act proviso as well, covers every contract to which the United States, any Territory, or the District of Columbia is a party, or made for or on behalf of the United States, any Territory, or said District. Section 2 of the law names certain exceptions to the above. From this it appears that *all* Government contracts are subject to the law *unless* they clearly appear to be within any of these express exceptions. The eight-hour provision need not be inserted in contracts falling within the exceptions; while, if certain things included in the contract of purchase are covered by the statutory exceptions, they should be expressly excepted in the eight-hour stipulation inserted in the contract.

(*c*) If the work done comes within the provisions of the law, it is immaterial by whom the labor is employed, whether by a contractor, subcontractor, or sub-subcontractor, the test being merely whether or not the laborer or mechanic is actually employed on such work.

(*d*) If a particular article or material contracted for or purchased comes within the eight-hour provision, a difficult question often arises as to how far back in its manufacture the eight-hour requirements apply. Obviously the law can not go back to the production of all the raw materials of which it may be eventually composed. The statute applies to "work contemplated by the contract." This seems to mean work directly and proximately in view as necessary to make the particular article contracted for, as distinguished from other articles. In other words, the eight-hour law goes back to that period in the manufacture when the materials used may first be identified as specifically appropriated and destined for the fulfillment of the Government order, as distinguished from the orders of other patrons or the general commercial output of the contractor.

Thus, by way of example, for guns, forged-steel projectiles, or forged-steel parts of carriages the law begins to apply with the shaping of the billet of steel to the particular use intended. Similarly, for cast-iron or cast-steel projectiles or parts of carriages the law applies to the making of the patterns and the preparation of

the mold. In the manufacture of smokeless powder, the dehydration process in the preparation of the nitrocellulose marks the beginning of the application of the law, for at this point the manufacture of military smokeless powder starts to differ from that of commercial smokeless powder: i. e., the point of first differentiation from other products marks the incidence of the law.

If an article is made up of component parts which are articles or materials ordinarily purchasable ready made in open market and which have not been manufactured by the Government (i. e., coming within the exceptions to the statute, as outlined in divisions III and IV of this pamphlet), the eight-hour law will not apply to the manufacture of such parts. The test as to the application of the law to such parts is the same, whether the Government orders parts directly or orders a completed article and leaves it to the contractor or subcontractor to make or procure the parts.

(*e*) The general work done by a contractor or subcontractor in his plant, which is applicable and destined to the fulfillment of his contracts with all persons generally, does not fall within the eight-hour provisions. Of such a nature would, in most cases, be the work connected with the generation of power, the operating facilities for handling materials not yet appropriated to the Government contract, and the care and upkeep of machines, tools, buildings, etc., in general use.

The making of molds or other special devices or tools used in connection with manufacture under a contract within the law, which from their nature disappear in the process of manufacture or are of no use for other purposes, comes under the law. Tools, machines, fixtures, and the like used to facilitate the manufacture of articles on an eight-hour contract, which would not ordinarily be worn out on the particular contract and would remain the property of the contractor and be available for use on other contracts, are regarded as part of the contractor's plant, and their manufacture therefore is not subject to eight-hour provisions.

(*f*) It is suggested that the following article be inserted in contracts falling within the provisions of the statute:

ARTICLE —. It is agreed that wages of laborers and mechanics doing any part of the work contemplated by this contract (except ———),[1] in the employ of the contractor or any subcontractor contracting for any part of such work so contemplated shall be computed upon a basic day rate of eight hours' work, with overtime rates to be paid for at not less than time and one-half for all

[1] If certain articles or materials covered by the contract are not within the eight-hour provisions, they should here be enumerated.

hours in excess of eight hours, this stipulation being in accordance with the provisions of the eight-hour act, approved June 19, 1912, the naval appropriation act, approved March 4, 1917, and the Executive orders of the President thereunder. For each violation of the requirements of this article it is agreed that the liquidated damages accruing to the United States shall be the sum of five ($5) dollars for each laborer or mechanic for every calendar day in which he shall be required or permitted to labor upon said work for wages computed otherwise than as herein provided, and all such damages thus incurred shall be withheld by the United States from payments under this contract.

(*g*) Of course, if the eight-hour provisions of the naval act proviso apply to a Government contract, the contractor must conform to the requirements of the law, even though he has not expressly agreed to do so in his contract. For the information and clear understanding of the contractor and his mechanics and laborers, it seems advisable to insert the stipulation in cases where it is applicable. The policy of contracting officers should be in all cases to determine before a contract is executed whether it falls within the provisions of the eight-hour statute. If it does, the attention of the prospective contractor should be called to the fact.

CONTRACTS EXCEPTED BY THE LAW.

(*a*) Section 2 of the eight-hour law, approved June 19, 1912, contains certain exceptions to the eight-hour limitation therein imposed, which exceptions now also apply in considering the wage provisions of the naval act proviso. The exceptions applying to contracts for transportation by land or water, for the transmission of intelligence, and for the construction or repair of levees or revetments necessary for protection against floods or overflows on the navigable waters of the United States, and the express inclusion within the law of armor and armor plate, are fairly clear and explicit and in most instances do not give rise to difficulties.

That portion of the exceptions which is particularly important in the present emergency and which occasions the most difficulty is as follows:

> Nothing in this act shall apply to contracts * * * for the purchase of supplies by the Government, whether manufactured to conform to particular specifications or not, or for such materials or articles as may usually be bought in open market * * * whether made to conform to particular specifications or not.

(*b*) Contracts for "supplies," as excepted in the above provision, include contracts for supplying water and electric light to forts, army posts, etc. But in so far as supplies are articles or materials, the provision as to "supplies" is substantially included within that as to

"materials or articles," the latter being the more comprehensive. Therefore a consideration of this latter provision will answer most if not all questions arising under the former.

(*c*) In this exception the statute contemplates two classes of materials and articles. One of these classes comprise those which are usually made to order, or "ordered" and "made" according to particular specifications, or manufactured in a particular manner, shape, or condition according to the specifications of the person for whom they are made, each order being sui generis. The other class consists of those articles and materials which are usually manufactured in stock and standard forms, are usually found in stock, and which producers or dealers usually offer or supply "ready made" to the commercial trade generally. Articles of this second class are excepted from the provisions of the eight-hour law, except as they may be affected by the further proviso or limitation upon the exceptions taken up in division 4 of this pamphlet.

(*d*) In employing the word "usually," it is believed that the statute intends that only such articles are excepted as may in normal times usually be so bought for commercial use in the United States. The fact that in the present war situation certain articles are being made to such an extent that they are now manufactured more or less in standard forms for purchase either by the United States or our allies does not bring them within the exception. For example, if it should be claimed to be a fact that rough-shell body forgings or machine guns are now being made in standard forms to be applied indiscriminately to the fulfillment of various orders of the different governments, that would not bring such forgings or such machine guns within the exception. They are not articles ordinarily purchasable "ready-made" on the market for commercial use.

(*e*) Materials and articles are excepted "whether made to conform to particular specifications or not." This shows clearly that the test laid down by the statute is not whether in the particular instance the contract is for the purchase of ready-made goods or for goods to be made to special order. The form of the contract does not control, as this phrase in the statute emphasizes. The line of division is whether or not such articles are of the class that may usually be bought on the market although in the specific contract they are ordered to be manufactured to conform to particular specifications.

Caution should be exercised not to give too great effect to the phrase "whether made to conform to particular specifications or not." It may well be that the particular specifications comprised in the

Government contract are of such a character as to make the finished article sufficiently different from the class of articles in general commercial use in standard forms to remove it, when completed, from that class. In that event the contract is within the eight-hour provisions. For example, if it be a fact that military smokeless powder is simply a form of common smokeless powder, so that it can fairly be said that military smokeless powder is nothing more than common smokeless powder manufactured to conform to particular specifications, it would fall within the exception. If, however, military smokeless powder, because of the particular specifications, be a distinct species of powder, then since it can not be bought as such on the open market, it would not fall within the exception.

(*f*) The most difficult problem arising in considering the exception applying to "such materials or articles as may usually be bought in open market" is to define the limits of a particular class of articles with a view to determining whether or not the article being purchased falls within that class. Obviously, if the class is made large and comprehensive, nearly all contracts would be excepted from the statute. Thus if "arms" is made the class, all sorts of rifles, guns, revolvers, etc., will be excepted from the statute, for the reason that "arms" may usually be purchased ready-made on the market, although the particular articles purchased might not be. So, if "wagons" is considered the class, inasmuch as they usually may be purchased in standard forms on the market, all sorts of special types of Army conveyances, although for purposes for which standard forms are never made, would be excepted. Such a division into classes is too broad. The species of wagons or arms should be considered rather than the general class or genus. Thus "revolvers" or "ambulances," as the case may be, instead of "arms" or "wagons," seems the proper division to be applied. Of course too fine a classification into subspecies should not be made. Thus, battle sights are in the same class as other rifle sights, although they chance to be of a different type and placed differently upon the rifle. On the other hand, telescopic rifle sights are so differently constructed, in that they contain optical lenses, that they may well be considered in a separate class. Since there seems to be no scientific way to divide species of manufactured articles and materials, it must be a question for administrative judgment upon the facts of trade conditions in each instance.

(*g*) By way of illustration, the following articles, when of the usual kind, are among those that have been held to fall within the exceptions as to supplies and materials and articles that may usually be bought in open market: Paper, ink, leather, and cloths, and sim-

ilar articles used in printing and binding productions; reproduction of maps, photographs, and the like, printing and binding machinery; Colt pistols and revolvers; lamp standards and brackets, although made from special drawings; dynamos and engines, although made in accordance with special requirements; tile for roofing, terra cotta, bricks, plaster, doors, sashes, and molding which are procurable in the market; locomotives and flying machines. Of course articles such as cannon, carriages for cannon, projectiles, cannon powder, machine guns, fuzes, etc., are not commercial articles; and as they do not come within the exceptions they fall within the eight-hour-law provisions.

In citing the above examples and other examples in this division of this pamphlet, the question of their manufacture by the Government has been left out of consideration. (See division IV.)

(*h*) It is immaterial whether the Government furnishes the raw materials and merely contracts for the performance of labor, or contracts for all labor and materials. Likewise a contract to remodel or repair an article is the same as a contract for its original manufacture.

LIMITATION UPON EXCEPTIONS TO THE LAW.

(*a*) The exceptions enumerated in section 2 of the act of June 19, 1912, are all subject to a proviso as follows:

> *Provided*, That all classes of work which have been, are now, or may hereafter be performed by the Government shall, when done by contract by individuals, firms, or corporations, for or on behalf of the United States * * * be performed in accordance with the terms and provisions of this act.

This proviso clearly acts as a limitation upon the foregoing exceptions and makes what is equivalent to an exception thereto.

(*b* In order to determine whether the Government has performed work of the same class as that contemplated in any contract, the facts as to Government manufacture up to the time of making the contract must be known. That the Government may have discontinued such manufacture is immaterial. If at the time of the contract or at any time in recent years such work has been or had been performed by the Government for a sufficient period of time to indicate that the work is or was ordinarily being performed up to an appreciable amount of the then Government requirements, the contract is within the eight-hour provisions. If the work performed by the Government is or was only up to a limited extent of its requirements, or for a short period, or merely experimental, then if

the articles or materials fall within the exceptions mentioned in division III of this pamphlet the contract falls outside the law.

(*c*) No absolute rule can be laid down as to what constitutes an appreciable amount of the Government's requirements. It is suggested that in the neighborhood of 25 per cent would be sufficient to bring the article within the operation of the law. It makes no difference what governmental department or bureau has performed the work or what ratio the Government manufacture bears to the amount of the product prepared for other consumers. It may be that, due to present war conditions, a very great proportion of the total Government requirements of any particular material are now being met by outside contractors. However, if prior to present abnormal times the Government manufactured an appreciable amount of its then needs, a contract for such material must contain the eight-hour provisions.

Thus small forgings, cast iron, steel castings, rifle and cannon powder, ammunition for small arms, and the like, have been regularly manufactured by the Government in quantities forming an appreciable part of the total required each year, and therefore, if contracted for, the contracts must contain the eight-hour wage provisions of the naval act proviso. That is true even if, due to present extraordinary needs, the Government may no longer be making an appreciable part of its total demands for any of such articles. On the other hand, the manufacture of Colt pistols is an example of Government manufacture that was not sufficient to take such pistols, which are articles of the sort usually purchasable on the market, out of the exception to the statutory provisions. The Government did for a time make parts of such pistols up to perhaps 30 per cent of its requirements, but discontinued the manufacture while the same was still substantially in the experimental stage.

(*d*) In determining whether or not the product contracted for in the particular instance belongs to a class of work previously performed by the Government, there is the same difficulty in drawing class lines that arises in determining what articles may usually be bought in open market. The establishment of too broad a class in this case, however, increases the application of the eight-hour law instead of diminishing it. The same rules for determining the class should therefore be used in both cases in order that the law may be fairly administered. (See Division III of this pamphlet, sec. *f*.)

(*e*) In interpreting this proviso as to Government manufacture, it may be said that its purpose was to prevent the officials of the Government from evading the requirements of the eight-hour law

as to mechanics and laborers directly employed by the Government, by causing work of the general nature ordinarily performed directly by the Government itself to be done by outside contract. This is in a sense true, and certainly any such attempted evasion would come within the law. But it is not the sole test. The most recent opinions of the Attorney General state that the purpose of the statute was to extend the policy of the eight-hour laws. This being the case, there can be no doubt that contracts for articles which the Government has ordinarily manufactured to an appreciable extent are within the law, whether or not Government officers have tried by making the contract to evade eight-hour provisions.

Another incorrect test, not authorized by the statute, would be to exclude from the operation of the law all patented articles or articles made on licensed machines. If the Government has in fact ordinarily made such articles to the necessary extent, contracts for their manufacture come within the law.

THE ENFORCEMENT OF THE LAW.

(*a*) Under the naval act proviso the eight-hour law of June 19, 1912, has been changed in effect from a maximum hours' limitation to a provision necessitating a basic eight-hour-day rate, with time and one-half for overtime. In other words, the spirit of the law is still to encourage the establishment of an eight-hour day, but, due to the present exigency, this is not done as heretofore by an absolute limitation. Instead, work in excess of eight hours is permitted, but only on the condition of payment to the workers of time and one-half for such overtime, the intent being thereby to discourage overtime except where required by war-production needs. But no change has been made in the fact that the decision in each instance as to whether the eight-hour wage provision should be placed in a contract lies with the contracting officer as an administrative matter, subject, of course, to such supervision as the chief of the bureau may deem expedient. In doubtful cases a call may be made, in pursuance to the Secretary's order, for assistance in such administration. In deciding questions arising under the law, the general intent of Congress to extend eight-hour provisions should be borne in mind, with a view to making determinations, in carrying out that intent, that will be fair to both the laborers and the contractors.

An administrative decision demands a consideration of facts. Many factors enter into the situation. The records of past and present Government manufacture and trade and market conditions need

to be examined and understood. In order to do this it may often be advisable to hear the views of both the contractor and the representatives of labor.

(*b*) The eight-hour law, approved June 19, 1912, provided for a penalty of $5 for each violation of its provisions. The naval act proviso and the Executive order of the President have probably incorporated this penalty as applying to violations of the wage provisions of the naval act proviso. There is, however, a possibility of a difference of opinion upon this. In order to obviate any necessity of having the question determined, a provision for liquidated damages is suggested to be inserted in the contract. (See Division II, sec. *f*. of this pamphlet.)

(*c*) Section 1 of the eight-hour law of June 19, 1912, provides for a method of enforcing the law through the Government inspectors of the work to be performed under the contract. Wholly apart from this, the War Department, of course, is empowered to adopt such a method of enforcement of the provisions of the naval act proviso as may be necessary. This enforcement should continue to be in the hands of the inspectors, as they offer what seems to be the best means of making certain that the law is observed. The contractor should be required to make proof of his compliance with the law and the inspector should, so far as practicable, add his own comments before sending in the proof to superior officers, the degree and manner of proof depending upon the nature of the particular case.

(*d*) In the event of any labor disputes arising because of the enforcement or nonenforcement of the eight-hour provisions in any contract, that dispute may be settled by the Secretary of War in the same manner as other labor disputes.

(*e*) A question which may often come before inspectors is whether or not a piecework method of paying mechanics and laborers answers the requirements of the law. The naval act proviso requires "a basic day rate of eight hours with overtime rates * * * at not less than time and one-half * * *." This does not mean that piecework is not permissible. The proviso evidently means to inhibit overtime work, except such as is sufficiently required, in consequence of national emergency, to justify time and one-half pay for overtime. Only such a method of paying employees as substantially complies with this intent and bona fide approximates time and one-half pay for all work done in excess of eight hours is satisfactory. The means of accommodating piecework to this basis must necessarily vary in different industries and factories. It may be feasible in a particular plant to pay one and a half times the regular piece

rate for units made during the overtime period. Although technically, as a greater or less number of units may be produced per hour during overtime than during the regular day, this may not always exactly figure out as time and one-half for overtime, it seems to be a substantial compliance with the law. Another permissible method is to average a pieceworker's earnings per hour over a period of time and then pay him for overtime a 50 per cent increased time rate for hours in excess of eight hours. If practicable, another way to meet the law is to establish a bona fide basic eight-hour day rate with time and one-half for overtime and give the worker the option of taking each day the time rate of pay or his earnings as a pieceworker. The foregoing enumeration of methods is not intended to be exclusive of others which actually afford the worker time and one-half for overtime. A flat increase in the general piece rate proportioned to the number of hours worked per day in excess of eight hours will not ordinarily be in accord with the law's provisions. It is a question of fact in each instance as to whether the wage arrangement adopted actually gives the increased overtime rate, so that work in excess of eight hours can be carried on solely at increased wage cost.

FELIX FRANKFURTER.
For the Secretary of War.

SEPTEMBER 25, 1917.

APPLICATION OF THE EIGHT-HOUR LAW.

MEMORANDUM TO THE WAR LABOR POLICIES BOARD.[1]

The committee appointed to investigate into the question of the applicability of the eight-hour laws and the Executive orders of the President requiring the wages of persons employed upon certain Government work to be computed upon a basic day rate of eight hours with time and one-half for overtime makes the following report:

1. EXISTING EIGHT-HOUR LAWS AND EXECUTIVE ORDERS.

Prior to March 24, 1917, there were two different laws containing provisions limiting the hours of work of laborers and mechanics to eight hours.

(*a*) By the act of March 3, 1913 (which amended the act of Aug. 1, 1892), the service and employment of all laborers and mechanics who are now or may hereafter be employed by the Government of the United States or the District of Columbia or by any contractor or subcontractor upon a public work of the United States or of the District of Columbia are limited and restricted to eight hours in any one calendar day; and it is made a misdemeanor for any officer of the United States Government or for any such contractor or subcontractor to require or permit such laborers and mechanics to work more than eight hours in any calendar day except in case of extraordinary emergency.

(*b*) By Executive order of the President, dated April 28, 1917, the current status of war was declared, "to constitute an 'extraordinary emergency' within the meaning of that term as used in the eight-hour act of March 3, 1913, and that laborers and mechanics employed," in "the construction of any military building or for any public work which in the judgment of the Secretary of War is important for purposes of national defense," whether employed by Government contractors or by agents of the Government, may be required to work in excess of eight hours per day. When laborers and mechanics under the provisions of that order are required to work more than eight hours their wages must be computed upon a basic day rate of eight hours with time and one-half for overtime.

(*c*) The act of June 19, 1912, provided that every contract to which the United States is a party which will involve the employment of laborers or mechanics shall contain a provision that no laborer or mechanic doing any part of the work contemplated by the contract shall be required or permitted to work more than eight hours in any one day. This act excepted from its operation contracts for such materials or articles as may usually be purchased in the open market, whether made to conform to particular specifications or not. This ex-

[1] Memorandum of June 21, 1918, revised.

ception was limited by a provision that all classes of work which have been or are now being performed by the Government shall when done by contract be performed in accordance with the terms of the eight-hour law.

This act was suspended by the Executive order of the President dated March 24, 1917, pursuant to the authority vested in the President by the naval appropriation act proviso approved March 4, 1917, upon the condition that the wages of persons employed upon such contracts shall be computed noon a basic day-rate of eight hours with time and one-half for all overtime work in excess of eight hours.

2. DIFFICULTIES EXPERIENCED IN THE APPLICATION OF THE EIGHT-HOUR LAW AND OF THE EXECUTIVE ORDER.

(*a*) No difficulties have been experienced in carrying out the provisions of August 1, 1892, and of March 3, 1913.

(*b*) It is in the application of the Executive order to contracts originally included within the act of June 19, 1912, that the greatest difficulties have been encountered. Under the present law only those contracts which were subject to the eight-hour law are subject to the provisions of the Executive order. This has given rise to a series of difficult questions as to whether the articles contracted for are usually purchased in the open market or whether the Government itself has been or is now to any substantial extent manufacturing these articles. Furthermore, different rulings were made by the Army and Navy with respect to the applicability of the Executive order of the President.

(*c*) Difficulties in standardizing wages. Overtime work is one of the recognized methods of increasing wages. Unless uniform provisions are made for overtime no standard scale of wages fixed by any board will produce the result desired, since a manufacturer paying time and one-half for overtime for the ninth and tenth hour is in fact paying a 10 per cent higher wage that one who pays straight time for this work. If we are to effectively standardize wages we must also standardize overtime, and we can not, without creating new difficulties with labor, require an employer who is maintaining the 8-hour basic day to change to the 10-hour day. This can probably be overcome by taking this fact into account in standardizing wages.

3. THE EFFECT OF INCONSISTENT RULINGS.

In many cases workers in the same factories engaged on different articles needed by the Government were treated differently. In more numerous instances workers in adjoining factories engaged on Government work, by reason of the nature of the articles manufactured, were treated differently. These rulings, which in the light of present conditions would seem arbitrary to the workers (whatever historical justification they might have), have created in the workers a sense of injustice and of unfair discrimination which has been responsible for a great many labor troubles.

4. From the point of view of the Government no reason exists at the present time for distinction between the different classes of Government work. The policy underlying the act of June 19, 1912, was that of persons employed by contractors doing work especially for the United States, were indirectly in the employ of the United States and were to be treated in the same way as employees working directly for the Government. With respect to articles that

were usually purchased in the open market the Government was to be like any other purchaser.

At the present time all open market purchases have largely been done away with and every contractor is in effect manufacturing articles especially for the Government.

Furthermore, the exception contained in the eight-hour law is important where contracts are awarded as a result of competitive bidding. To require compliance with the eight-hour law under such circumstances would have so narrowed the field of competition as practically to do away with the provisions requiring competitive bidding. To-day, where the problem has become one of manufacture, and hardly any articles are purchased ready-made, it is no longer necessary for the protection of the Government to except articles that are usually purchased in the open market from the eight-hour law.

5. OBJECTION TO POLICY OF APPLYING EIGHT-HOUR LAW AND THE EXECUTIVE ORDER TO ALL GOVERNMENT CONTRACTS.

The objection made by manufacturers to the uniform application of the Executive order is twofold.

The first objection is that the Executive order recognized eight hours as a basic day. Manufacturers are unwilling to give to the eight-hour day this recognition for fear that it will form a precedent for conditions after the war.

The other objection urged by the manufacturers is far more serious, and should determine our position at the present time. It can not be doubted that if the eight-hour day is established as to Government work a manufacturer doing both civilian work and Government work will be compelled to pay the same rate of pay to those engaged on private work. Since a great many concerns are doing both Government and private work, the application of the provisions of the Executive order to the work done for the Government will have the effect of disturbing the conditions in their factories, upsetting the well-developed organization of some of the most important factories of the country, which are now at their maximum of efficiency, and thus interfering with the production of the articles needed by the Government.

6. RECOMMENDATION.

No remedy that can be suggested to-day is without its attendant difficulties. Rarely do we have a clear-cut issue between what is right and what is wrong or between what is beneficial and what is detrimental. In nearly all cases the problem presented calls for a balancing of conveniences and inconveniences which will result from a proposed solution. On the one hand it is desirable to eliminate a great cause of labor trouble, put an end to a sense of injustice in the workers resulting from what must to them appear to be an arbitrary discrimination, and finally make possible and effective any action of the Policies Board standardizing wages of different classes of workers employed upon Government work. On the other hand, it is very important in this crisis not to interfere with the normal and effective flow of the production of the supplies needed by the Army.

The committee therefore recommends—

(1) That as heretofore all mechanics and laborers employed by the Government directly should be paid upon a basic day rate of eight hours, with overtime paid for at the rate of time and one-half.

(2) That mechanics and laborers employed upon work of construction shall be paid in the same way.

(3) (*a*) While a uniform application of the wage provisions of the Executive order of March 24, 1917, to all work done by the Government will tend to eliminate one of the most serious causes for labor trouble, such action, if taken at the present time, will seriously interfere with and hamper the Government departments in securing the supplies needed in the prosecution of this war.

(*b*) That conferences be had between this committee and the manufacturers engaged in producing Government supplies to consider to what extent during the pendency of this war the adoption of the basic eight-hour day principle of determining wages is feasible.

(*c*) That pending such conferences the wage provisions of the Executive order be applied as heretofore to all cases where existing law requires it.

(*d*) That in cases where the Executive order is applicable a clause be inserted in the contract requiring compliance with its provisions. The clause should be in the form hereto annexed. This will definitely inform the contractor whether he is required to comply with the Executive order or not; and

(*e*) In order to secure uniformity of the decisions among the different departments of the Government the present committee be continued and all departments be directed to refer to this committee all communications calling for the construction of the eight-hour law of 1912 and the Executive order of March 24, 1917, or complaints with regard to the applicability of the Executive order to any particular contract.

SAMUEL J. ROSENSOHN,
Counsel to the Committee.

EIGHT-HOUR CLAUSE.

EIGHT-HOUR BASIC DAY, TIME AND ONE-HALF FOR OVERTIME—DAMAGES FOR VIOLATION.

Wages of laborers, operatives, and mechanics doing any part of the work contemplated by this contract in the employ of the contractor shall be computed upon a basic day rate of eight hours' work, with overtime rates to be paid for at not less than time and one-half for all hours in excess of eight hours. Compliance by the contractor with the provisions of this article shall be of the essence of the contract.

PART III.

EFFECT OF REDUCTION OF HOURS UPON OUTPUT IN VARIOUS INDUSTRIES.

SUMMARY.

The material submitted herewith shows the experience of various establishments and industries relating to the effect of reduction of hours of labor upon output and cost of production. The data submitted are by no means exhaustive, and possibly important experiences have been overlooked. It is believed, however, that the examples cited are representative and are a fair indication of the effect reduction of hours has upon output.

The data covered which appear in Appendix C and are summarized in the statement immediately below, giving the name of company, industry, and source, include the following cases:

Munitions manufacturing (Great Britain). Great Britain ministry of munitions, health of munition workers committee, memoranda Nos. 5, 12, 7, 20. Great Britain Home Office, investigation of fatigue by physiological methods.

Commonwealth Steel Co., iron and steel. United States Bureau of Labor Statistics, report on conditions of employment in the iron and steel industry in the United States (S. Doc. No. 110, 62d Cong., 1st sess., v. 3).

John E. Grant (England), iron and steel. Letter from John E. Grant published in Engineering (London), October 22, 1915.

Anthracite coal, mining. Monthly Review of the United States Bureau of Labor Statistics, August, 1917.

William J. Crawford Co., granite. Letter from W. J. Crawford published in the hearings on the eight-hour bill (H. R. 27281) before the House Committee on Labor, January 30 to February 6–12, 1913.

United States Navy Yard *v.* Newport News Shipbuilding Co., battleships. The eight-hour day and Government construction by direct labor, by Ethelbert Stewart. In Commons, May, 1905.

Paper manufacturing industry, paper. United States Tariff Board. Report on pulp and news print paper industry, 1911, pages —.

W. H. McElwain Co., boots and shoes. The Survey, May 12, 1917, reprinted in the United States Bureau of Labor Statistics Monthly Review, June, 1917.

Boot and shoe industry, boots and shoes. National Industrial Conference Board. Hours of work as related to output and health of workers: Research report No. 7, June, 1918.

Fayette R. Plumb (Inc.), tool manufacture. Monthly Review of the United States Bureau of Labor Statistics, June, 1917.

J. H. Williams & Co., iron forgings. United States Industrial Commission Report, 1901, volume 14.

Cotton manufacturing, cotton. National Industrial Conference Board. Hours of work as related to output and health of workers, cotton manufacturing. Research report No. 4. March, 1918.

Manufacturing (general), manufacturing. Eight-hours for laborers on Government work. Report by V. M. Metcalf, Secretary Department of Commerce and Labor, on H. R. 4064 (eight-hour bill), 1904.

Zeiss Optical Works, Jena, Germany, optical goods. Abbé, Ernst. Die Volkwerbschaftliche Bedeutung der Verkürzung des industriellen arbeitstages. Jena, 1901. Digest in Goldmark's "Fatigue and Efficiency," 1912.

Engis Chemical Works, Liege, Belgium, chemical goods. Fromont, L. G. Une expériènce industrielle de réduction de la journée de travail. Brussels, 1906. Digest in Goldmark's "Fatigue and Efficiency." 1912.

Salford Iron Works, Manchester, England, iron and steel. Eight hours for laborers on Government work. A report of the Secretary of Commerce and Labor to the House Committee on Labor, 1905.

Cleveland Hardware Co., hardware. Survey, February 2, 1918.

Joseph Feiss Co., clothing. Survey (New York), February 2, 1918.

In addition to the above sources a summary has been made of "The Case for the Shorter Work Day," brief of Mr. Felix Frankfurter in the Oregon ten-hour case before the Supreme Court of the United States, 1915, giving name of establishment, industry, date, reduction in hours and result in each case.

EFFECT OF REDUCTION OF HOURS UPON OUTPUT IN VARIOUS INDUSTRIES.

Commonwealth Steel Co., Granite City, Ill., iron and steel, 1912, 12 to 8 hours. Under the 8-hour system, in spite of the increase in hourly rates, there was a slight decrease in the cost of production, owing to the higher efficiency of the workers. Also the quality of the product was very much improved.

John E. Grant Co., England, iron and steel, 1914, from two 10-hour shifts to three 8-hour shifts. Normal weekly working hours increased 34 per cent. Output per man-hour increased, each man in his 48-hour week doing as much as he did before in the 50-hour week. Output increased 50 per cent.

W. H. McElwain Co., Boston, Mass., boot and shoe, 1916–17, 55-hour week to 52-hour week. Productive unit per employee per day increased from 8.91 to 9.02. Our experience has been that overtime work is decidedly undesirable.

Twelve coal companies, anthracite coal, 1915–16, 9 to 8 hours. Output per man-day for miners and miners' laborers in gross tons increased from 4.08 in 1915 to 4.20 in 1916; output per man-day for all labor in gross tons increased from 2.03 in 1915 to 2.06 in 1916.

Wm. J. Crawford & Co., Buffalo, granite, 1912, 10 to 9 hours and 9 to 8 hours. The same man, under identically the same conditions, accomplished more of exactly the same kind of work when he was working 9 hours than he did when he was working 10 hours; and again, when the hours were reduced

to 8 hours this same man accomplished still more in an 8-hour day than he did in a 9-hour day.

United States Navy Yard of Brooklyn, and Newport News Shipbuilding Co. (a private company), shipbuilding, 1903–4, 8-hour day in Government yard; 10-hour day in Newport News Co. Two battleships were built simultaneously, one, the *Connecticut*, by the United States navy yard in Brooklyn, under the 8-hour day and by union men; the other, the *Louisiana*, by contract by the Newport News Shipbuilding Co., employing its men 10 hours a day. The average production per man per hour on the *Connecticut* exceeded by 24.48 per cent the average production per man per hour on the *Louisiana*.

Several paper mills, paper manufacture, 1908–9, 12 to 8 hours. Change from a 12-hour to an 8-hour system in 1909 showed a reduction in the labor cost per ton of paper from $4.35 to $3.73. In other words, an increase in the hourly rate of wages to the extent of 33 per cent not only failed to result in a corresponding increase in the cost of labor per ton of paper but was accompanied by an actual reduction in cost. While the figures of $4.35 in 1908 happened to be the highest in 10 years, there was not a single year in that decade under the 12-hour system which showed as low a cost as in 1909, the first year under the 8-hour system.

One hundred ninety establishments, boot and shoe manufacturing, 1916–17, from 54 to 50 hours in majority of cases. Study made by National Industrial Conference Board presents the employer's point of view. Of 77 establishments reporting on output after reduction in hours, 31.2 per cent state that it was maintained and 68.8 per cent that it was decreased. Both groups reported an average reduction of between 4 and 4½ hours. The report concludes: "If all such hindrances as inefficient management, irregular hours, short-time piece-workers, and arbitrary reduction were eliminated, and a genuine spirit of cooperation was secured, it is possible that a 50-hour week would be as productive as a longer one."

Foyette R. Plumb (Inc.), Philadelphia, Pa., tool manufacturing, 1916–17, 57½ hours per week to 52½ hours per week. The weekly production in one of our worst departments, in spite of the shorter hours, has increased 18.4 per cent, and in the entire plant 10 per cent.

J. H. Williams & Co., Brooklyn, N. Y., iron and steel forgings, 1901, 10-hour day to 9-hour day. There is a slightly larger average output for the 9-hour day than for the 10-hour day, though in every other respect the work was done under similar conditions. There is throughout an increased rate of hourly output and a total output somewhat larger for the shorter working time.

One hundred and thirty establishments, cotton manufacturing, 1917, 57 to 54 hours and 64 to 60 hours. Study made by the National Industrial Conference Board presents the employer's viewpoint. Of the 130 establishments, 7.7 per cent maintained their previous output; 62 per cent showed a decrease in output; the effects upon output in the other establishments were not reported. Changes in policy, management, efficiency of machinery, material manufactured during period of investigation not stated.

Three hundred and ninety-six establishments, 83 manufacturing industries, 1904, various reductions. Out of 334 establishments, 11.1 per cent found no increase in cost of manufacture resulting from reduction in hours, while 88.9 per cent found manufacture was increased; also 9.3 per cent reported no de-

crease in quality of product, whereas in 90.7 per cent a decrease in product did result.

Zeiss Optical Works, Jena, Germany, optical instruments manufacturing, 1900, 9 to 8 hour day. Under the 8-hour system, as compared with the superseded 9-hour system, the hourly earnings of pieceworkers increased 16.2 per cent. This represents a greater daily output than before.

Engis Chemical Works, near Liege, Belgium, chemical manufacturing, 1892, two 12-hour shifts (10 hours actual work) to three 8-hour shifts ($7\frac{1}{2}$ hours actual work). Within 6 months after the change was effected the workers had equaled in $7\frac{1}{2}$ hours the previous output of 10 hours and the daily earnings for $7\frac{1}{2}$ hours' work equaled the amount formerly earned in 10 hours. The total cost of production was reduced 20 per cent and the quality of the output improved.

Salford Iron Works, Manchester, England, machinery manfacturing, 1893, 53 hours per week to 48 hours per week. At the end of a year's time it was found that the amount of output for the year was slightly greater than the average of the six preceding years.

APPENDIX A.

CASES OF REDUCTION OF THE WORKING DAY TO EIGHT HOURS, 1915 to 1918.[1]

The following tables present information as to the reduction of hours of labor to 8 per day, or 48 per week, in manufacturing and other establishments in the United States during 1915, 1916, 1917, and the first six months of 1918, as reported by leading trade-union periodicals, labor papers, trade journals, daily papers published in various parts of the country, and by replies to inquiries made by the bureau. While the information is necessarily incomplete, it is believed that the 876 reports from which data were obtained include no duplications.

As indicated in the following summary, 402 of these reports show the number of establishments involved, the total reported being 4,235. The number of employees affected was shown in 219 reports, the total being 1,440,532.

SUMMARY OF REPORTS.

Item.	1915	1916	1917, January to June.	1917, July to December.	1918, January to June.	Total.
Total number of reports examined	121	210	203	166	176	876
Reports showing number of establishments involved:						
Number of reports	99	134	69	63	37	402
Number of establishments reported	224	3,027	226	308	450	4,235
Reports showing number of employees affected:						
Number of reports	75	84	34	13	13	219
Number of employees reported	171,978	342,138	512,587	91,208	322,621	1,440,532
Reports showing both establishments involved and employees affected:						
Number of reports	73	67	17	11	10	178
Number of establishments reported	174	2,801	135	69	383	3,562
Number of employees reported	168,563	124,125	50,902	35,051	172,300	550,941

The following tables show by industries the number of establishments for which reports were obtained covering the periods specified. The table showing the number of employees reported may be found on page 6. As indicated in the preceding summary table, the sources of the data do not in all cases give both number of estab-

[1] Compiled by Bureau of Labor Statistics, Department of Labor.

lishments and number of employees, hence the total number of employees shown can not be related to the total number of establishments given.

NUMBER OF ESTABLISHMENTS REPORTED AS ADOPTING THE BASIC EIGHT-HOUR DAY IN 1915, 1916, 1917 AND THE FIRST SIX MONTHS OF 1918, BY INDUSTRIES.

	1915	1916	1917, January–June.	1917, July–December.	1918, January–June.	Total.
Aluminum manufacturing		1				1
Bakers		3	2	2		7
Boots and shoes		2			1	3
Bottlers and brewers	7	2	2	1	2	14
Brass workers	1	2	1			4
Broom manufacturers		31				31
Building trades		59	6	2	7	74
Carriages and automobiles		13	3			16
Cement and concrete	1	1				2
Chemicals	4	2				6
Clerks, store			4			4
Cooperage		3				3
Electric and gas lighting		2		1	1	4
Electrical supplies	8	4		2	4	18
Flour mills			1			1
Food and tobacco	4	2		1		7
Foundry and machine shops	154	256	23	42	11	486
Furniture		5	8			13
Garment workers	5	1,971	107	33		2,116
Glass manufacturing		1		2		3
Hardware and stove manufacturing	1	2	1		2	6
Hotel and restaurant workers		20				23
Iron and steel		1	1	3	1	3
Jewelry		200				200
Laundry	1	1				2
Leather workers				3	1	4
Lumber		5	5	154	200	364
Metal polishers		39	4	2	2	47
Mining		38	18		60	116
Municipal and State employees	2	4	3			9
Munitions	6	8	2		1	17
Musical instruments	1	2	1			4
Oil workers	4	4	3			11
Packers					18	18
Paint manufacturing					2	2
Paper manufacturing		28	2	20	19	69
Plated ware	2	1	2			5
Pattern makers			19			19
Policemen	1	1	3	1	2	8
Printing and publishing	3	1	1		1	6
Railroads		3	20	25	7	55
Rubber goods	1	11	1	1		14
Ship and boat building	2	4	1	4	4	15
Sporting goods	1					1
Street railways				2	3	5
Telephone and telegraph	1	1	1	6	1	10
Textile workers	1	1	2		100	104
Theatrical employees		1				1
Window cleaners		300				300
Miscellaneous		1	1	1		3
Total	224	3,027	226	308	450	4,235

Of the 876 reports examined the largest numbers were for the following six States: Ohio, Pennsylvania, New Jersey, New York, Massachusetts, Connecticut, in which were more than one-half of the total reports made.

The industry in which the largest number of employees was affected by the introduction of the so-called basic eight-hour day was the rail-

road, where more than 400,000 persons were affected. This was followed by the mining with 214,000, garment workers with 178,000. shipbuilding with 134,370, foundry and machine shop with 114,090. and slaughtering and meat packing with 101,300.

In several industries the number of establishments involved and the number of employees affected were given in but few of the reports, as in the building and baking trades.

The number of establishments involved and the number of employees affected as given in the reports of the first six months of 1918 is smaller than in the preceding years. This is due to the fact that few official reports of organizations for this period are as yet available, thus rendering it necessary to depend upon the more incomplete reports found elsewhere.

REDUCTION OF HOURS OF LABOR IN THE MACHINE TRADES.[1]

A movement for the reduction of hours of labor, notable for its rapid progress, has taken place in the machine trades since late in the summer of 1915. It has chiefly affected the firms having contracts for making war munitions, though not exclusively restricted to such establishments. The demands for reduced hours have usually come from machinists, although other occupations have joined, and in most establishments all employees have received the benefits in the reduction of hours which have been granted to machinists. Reduced hours of labor have in practically all cases been effected with no reduction in weekly wage, and in many cases with increased wage.

A partial list of the firms which had established the eight-hour day or granted a reduction in hours up to the middle of September was published in the October, 1915, issue of the Review. The International Association of Machinists has furnished the bureau a list supplementing the earlier list of firms which had granted reductions of hours up to the end of 1915. The following firms have established an eight-hour day, with reductions in most cases of seven hours in a working week:

ANSONIA, CONN.

O. K. Tool Holder Co.

BRIDGEPORT, CONN.

American-British Manufacturing Co.
American Graphophone Co.
Batchellor Corset Co.
Bridgeport Body Co.
Bridgeport Brass Co.
Bridgeport Metal Goods Co.
Bryant Electric Co.
Bullard Machine Co.
Burns & Bassick Co.

[1] Monthly Review of the Bureau of Labor Statistics, October, 1915, pp. 17, 18; February, 1916, pp. 37 and 38.

Crawford Laundry.
Electric Cable Co.
Grant Manufacturing Co.
Harris Engineering Co.
Harvey Hubble Co.
Hawthorne Co.
International Silver Co.
Lake Torpedo Boat Co.
Locomobile Co. of America.
Remington Arms Co.
Remington-Union Metallic Cartridge Co.
Sprague Motor Co.
Standard Manufacturing Co.
Warner Corset Co.
Wolverine Motor Co.

MERIDEN, CONN.

New England Westinghouse Co.

NEW HAVEN, CONN.

Geometric Tool Co.

SHELDON, CONN.

The N. R. Bassett Shop.

WILMINGTON, DEL.

Vogel Machine Co.

CHICAGO, ILL.

Automatic Electric Co.
Stewart Warner Speedometer Co.
Western Electric Co.

BATON ROUGE, LA.

Standard Oil Co.

BALTIMORE, MD.

Pool Engineering Co.
Universal Machine Co.

LOWELL, MASS.

Heinze Electric Co.
United States Cartridge Co.

SPRINGFIELD, MASS.

Barley Machine Co.
Barney & Berry (Inc.).
Bausch Machine Tool Co.
Bay State Corset Co.
Blake Machine Co.
Bosch Magneto Co.
Duckworth Chain Co.
Gilbert & Barker Co.
Hendee Motorcycle Co.
Kibbie Candy Co.
Knox Automobile Co.
Knox Motor Co.
National Equipment Co.
Package Machinery Co.
Rider Bagg Co.
Russell Machine Co.
Stacy Machine Co.
United States Saw Co.
Westinghouse Co.

TAUNTON, MASS.

Call & Carr Co.
Mason Machine Co.
Mickle Printing Press Co.

DETROIT, MICH.

Siewek Bros.
The Studebaker Corporation.

CAMDEN, N. J.

Victor Talking Machine Co.

GARWOOD, N. J.

Bell Electric Co.
Hyatt Roller & Bearing Co.

PERTH AMBOY, N. J.

American Smelting & Refining Co.
Annes-Potter Brick Co.
Barber Asphalt Co.
Lyons-Flyn Co.
Perth Amboy Dry Dock.
Raritan Dry Dock Co.
Raritan Copper Works.
R. & H. Chemical Co.
Shantz & Exkert.
Standard Cable Co.
Union Lead Co.
United States Cartridge Co.
Patrick Whites.

PLAINFIELD, N. J.

Bosch Magneto Co.
Manganese Steel Safe Co.
Pond Machine Tool Co.
Potter Press Co.
Sauer Motor Truck Co.
Scott Printing Press Co.
Vitaphone Co.
Hall Printing Press Co.

SOUTH PLAINFIELD, N. J.

Spicer Manufacturing Co.

TRENTON, N. J.

J. L. Mott.
Harry Stahl.
E. Wilkes.

NEW YORK CITY AND VICINITY.

Adriance Machine Co.
Acme Die Casting Co.
Auto Press Co.
Blair Machine Co.
Bliss Manufacturing Co.
Cameron Machine Co.
Carpenter Tool Co.
Hoe Printing Press Co.
Doehler Die Casting Co.
W. W. Kellogg Co.
Notham Manufacturing Co. (49 hours).
Rockwell Engineering Co.
Shroeder Machine Co.
Sperry Gyroscope Co.
Wappler's Electric Co.

RALEIGH, N. C.

Raleigh Iron Works.

CINCINNATI, OHIO.

United States Printing & Lithographing Co.
United States Playing Card Co.

CLEVELAND, OHIO.

Cleveland Automatic Co.
F. B. Stearns Auto Manufacturing Co.
Sewer & Morgan Co.

SPRINGFIELD, OHIO.

Springfield Machine Tool Co.

TOLEDO, OHIO.

American Can Co.
Bock Bearing Co.
Bunting Brass & Bronze Co.
City Machine & Tool Co.
Consolidated Manufacturing Co.
Du Pont Powder Co.
O'Neill Machine Co.
Toledo Machine & Tool Co.
Willys-Overland Co.

YOUNGSTOWN, OHIO.

William Todd Co.

PITTSBURGH, PA.

Pittsburgh Machine Tool Co.

PROVIDENCE, R. I.

Providence Engineering Co.

MILWAUKEE, WIS.

Milwaukee Die & Casting Co. (44 hours a week).

The following firms have established a 54-hour week, reducing hours from 55, 58, and in some cases 60 per week:

SPRINGFIELD, MASS.

Hendee Motorcycle Co.

TAUNTON, MASS.

Bell & Dyer Co.
Evans Machine & Stamping Co.
Lincoln & Williams Twist Drill Co.
Vans Machine & Stamping Co.

TOLEDO, OHIO.

Acklyn Stamping Co.
Advance Machine Co.
Toledo Electro Plating Co.

DERBY, CONN.

Dairy Machine Co.

TORRINGTON, CONN.

Hendee Machine Co.

EAST PITTSBURGH, PA.

Westinghouse Co.

The following firms have granted reductions in hours, although the hours are still somewhat in excess of the straight 8-hour day:

FORTY-NINE AND ONE-HALF HOURS PER WEEK.

COLUMBUS, OHIO.

Hearne Manufacturing Co.
Rudd Manufacturing Co.
Shiriner Co.
Modern Tool & Die Co.

FIFTY HOURS PER WEEK.

BRISTOL, CONN.

New Departure Roller Bearing Co.

DERBY, CONN.

Birmingham Foundry & Machine Co.

JERSEY CITY, N. J.

Wickes Bros.

TRENTON, N. J.

J. A. Roebling.

NEW YORK CITY AND VICINITY.

Davis Bourville Co.

APPENDIX B.

LEGISLATION LIMITING HOURS OF LABOR FOR MEN.

The first restrictions of hours of labor of adult male employees related to hazardous occupations, such as mining and related employments. These laws were upheld as constitutional partly on the ground of individual health and safety rather than public welfare; that is, were regarded as health rather than labor laws. Railroad laws, the next important class to be enacted, find their justification largely in the safety of the traveling public, though of course that of the employees themselves is also a factor.

The general laws defining a day's labor "unless otherwise stipulated by contract" have a value more sentimental than practical. However, the later enactment of eight-hour laws of this class in place of those specifying 10 hours shows the tendency toward a shorter work day. The same is true of the enactment of eight-hour laws with regard to public roads and public works generally, though these stand on a different footing from private employment, since the State has a right to fix the conditions under which work for it and its subdivisions shall be done.

Another tendency to extend the restriction on hours, which had been confined to the labor of children and women and to the dangerous occupations and others depending on special reasons as noted, to the employment of men in general occupations, has recently become manifest. Mississippi and Oregon have 10-hour laws applying to all manufacturing establishments, the former containing an absolute restriction to 10 hours, while that of Oregon permits not more than 3 hours overtime work, to be paid for at the rate of time and one-half. The Mississippi act has been held valid by the supreme court of the State, while that of Oregon, after being upheld by the State supreme court, was also sustained by the Supreme Court of the United States in the case of Bunting *v.* Oregon, 37 Sup. Ct., 435.

On account of the provision for overtime the contention was raised that the act was more a regulation of wages than of hours of labor. The Federal Supreme Court said that it was not possible or necessary for that court to "know all the conditions that impelled the

law or its particular form," but quoted with apparent approval the statement of the State supreme court that "it is clear that the intent of the law is to make 10 hours a regular day's labor in the occupations to which reference is made."

A still further step was taken by the Legislature of Alaska in 1917, acting in response to an initiative vote of the people of the Territory. This act limits absolutely (except on proclamation of the governor on request of the Council of National Defense or the Secretary of the Interior in time of war) the hours of labor in all employments to eight per day.

LEGISLATION LIMITING THE HOURS OF LABOR FOR MEN.

I. IN CERTAIN PRIVATE BUSINESSES.

A. Mines.

1. Eight-Hour Laws.

Alaska: Acts 1913, ch. 29, sec. 2, amended 1915, ch. 6, sec. 2, and 1917, ch. 4, sec. 2,

Arizona: Rev. Stats. 1913: Civil Code, sec. 3108; Penal Code, sec. 713. Includes hoisting engineers.

California: Acts 1913, ch. 186, sec. 1.

Colorado: Constitution, art. 5; Acts 1913, ch. 95, sec. 2.

Idaho: Rev. Code 1909, sec. 1463.

Kansas: Acts 1917, ch. 242, sec. 1.

Missouri: Rev. Stat. 1909, secs. 7813 and 7814a, added by Acts 1913, p. 399.

Montana: Constitution, art. 18, sec. 4; Rev. Code 1907, sec. 1734, and sec. 1736, amended by ch. 21, Acts 1911.

Nevada: Rev. Laws 1912, secs. 1941, 6554, 6555, 6557. Includes mechanics, engineers, blacksmiths, carpenters, topmen and all surface employees.

Oklahoma: Rev. Laws 1910, sec. 4005.

Oregon: Lord's Oregon Laws, 1910, sec. 5058.

Pennsylvania: Acts 1911, p. 102, sec. 1. Hoisting engineers only.

Utah: Comp. Laws 1907, sec. 1337.

Washington: Codes and Stats., 1910, sec. 6583.

Wyoming: Constitution, art. XIX, sec. 1; Comp. Stat., 1910, sec. 3499.

2. Ten-Hour Laws.

Maryland: Pub. local laws, 1888, art. 1, sec. 194. (Allegany and Garrett Counties only.)

B. Smelters, Reduction Works, etc.

1. Eight-Hour Laws.

Alaska: Acts 1913, ch. 29, sec. 2, amended by Acts 1915, ch. 6, sec. 2.

Arizona: Rev. Stats. 1913, Civil Code, sec. 3108; Penal Code, sec. 713.

California: Acts 1913, ch. 186, sec. 1.

Colorado: Acts 1913, ch. 95, sec. 2.

1. EIGHT-HOUR LAWS—Continued.

Idaho: Rev. Code 1909, sec. 1464, amended Acts 1909, p. 4.
Missouri: Rev. Stat. 1909, sec. 7813.
Montana: Constitution, art. 18, sec. 4; Rev. Code 1907, sec. 1739.
Utah: Comp. Laws, 1907, sec. 1337.
Wyoming: Comp. Stat., 1910, sec. 3500.

MISCELLANEOUS PRIVATE BUSINESSES.

1. EIGHT-HOUR LAWS.

(*a*) *Electric light and power plants:*
Arizona: Rev. Stat. 1913, Penal Code, sec. 713.

(*b*) *Coke ovens:*
Alaska: Acts, 1913, ch. 29, sec. 2, amended by Acts 1915, ch. 6, sec. 2.
Arizona: Rev. Stat., 1913, Penal Code, sec. 713.
Colorado: Acts 1913, ch. 95, sec. 2.

(*c*) *Blast furnaces:*
Arizona: Rev. Stat., 1913, Penal Code, sec. 713.
Colorado: Acts 1913, ch. 95, sec. 2.

(*d*) *Plaster and cement mills:*
Arizona: Cement mills only. Rev. Stat., 1913, Penal Code, sec. 713.
Nevada: Rev. Laws, 1912, sec. 6559.

(*e*) *Plate glass works:*
Missouri: Rev. Stat. 1909, sec. 7814a, added by act. p. 399, Acts 1913.

(*f*) *Rolling mills, rod mills, stamp mills:*
Alaska: Acts 1913, ch. 29, sec. 2, amended by Acts 1915, ch. 6, sec. 2.
Arizona: Rev. Stat., 1913, Penal Code, sec. 713.
Colorado: Acts 1913, ch. 95, sec. 2. (Stamp mills.)
Idaho: Rev. Code, 1909, sec. 1464, amended Acts 1909, p. 4. (Stamp mills.)
Wyoming: Comp. Stat., 1910, sec. 3500. (Stamp mills.)

(*g*) *Tunnels:*
Arizona: Rev. Stat., 1913, Penal Code, sec. 713.
California: Acts 1913, ch. 186, sec. 1.
Montana: Rev. Code, 1907, sec. 1736.

(*h*) *In high air pressure:*
New Jersey: Acts 1914, ch. 121.
New York: Consol. Laws, 1909, sec. 134b, added by ch. 291, Acts 1909, amended ch. 528, Acts 1913.
Pennsylvania: Acts 1917, No. 364.
(In each of these States the limit is 8 hours when air pressure does not exceed 21 pounds to square inch: shorter hours in higher pressures.)

(*i*) *Irrigation works:*
Montana: Rev. Code 1907, sec. 2250.

2. NINE-HOUR LAWS.

(*a*) *Telephone operators:*
Montana: Acts of 1909, ch. 75, sec. 1. (In cities of 3,000 or over.)

3. Ten-Hour Laws.

(*a*) *Saw and planing mills:*

Arkansas: Acts 1905, No. 49, secs. 1, 2.

(*b*) *Bakeries:*

New Jersey: Acts 1912, ch. 127, sec. 7. (Not more than 60 hours in one week.)

(*c*) *Brickyards:*

New York: Consol. Laws, 1909, ch. 31, sec. 5. (Owned by corporations.)

(*d*) *Drug stores:*

California: Codes, 1906, Gen. Laws, Act No. 2665 as amended by ch. 224, Acts of 1907, sec. 2.

New York: Consol. Laws, 1909, ch. 45, sec. 236, as amended by ch. 514, secs. 1 and 2, 1914. (Not more than 70 hours in one week.)

(*e*) *Cotton and woolen mills:*

Georgia: Code, 1910, sec. 3137, as amended by act, p. 65, Acts 1911. (Not more than 60 hours in one week.)

Maryland: Pub. Gen. Laws, 1911, Art. C, sec. 1. (Except in contracts for work by hour.)

South Carolina: Criminal Code, 1912, sec. 421, amended by Acts 1916, ch. 547.

4. Eleven-Hour Laws.

(*a*) *Factories:*

North Carolina: Acts 1915, ch. 148. (Not more than 60 hours in one week.)

(*b*) *Grocery stores:*

New York: Consol. Laws, 1909, ch. 45, art. 11, amended by Acts 1915, ch. 343. (Not more than 70 hours in one week.)

D. A Day's Work Defined, Unless Otherwise Stipulated.

1. Eight-Hour Laws.

California: Political Code, 1906, sec. 3244.
Connecticut: General Stat., 1902, sec. 4692.
Illinois: Hurd's Rev. Stat., 1917, ch. 48, sec. 1.
Indiana: Annot. Stat., 1917, sec. 7977.
Missouri: Rev. Stat., 1909, sec. 7812.
New York: Consol. Laws, 1909, ch. 31, sec. 3, amended by ch. 494, Acts of 1913, and by ch. 152, sec. 1, Acts of 1916.
Ohio: Gen. Code, 1910, sec. 6241.
Pennsylvania: Digest, 1894, p. 1158, sec. 1.
Wisconsin: Stats., 1911, sec. 1729.

2. Ten-Hour Laws.

Florida: Stat., 1906, sec. 2641.
Maine: Rev. Stats., 1916, ch. 87, sec. 61.
Michigan: Comp. Laws, 1897, sec. 5454.
Minnesota: Gen. Stat., 1913, sec. 3831, amended 1917, ch. 248.
Nebraska: Rev. Stats., 1913, sec. 3561.
New Hampshire: Pub. Stats., 1891, ch. 180, sec. 20.
Rhode Island: Gen. Laws, 1909, ch. 249, sec. 24.

E. A Day's Work Limited, Regardless of Contract.

1. Eight-Hour Law.

Alaska. Acts, 1917, ch. 55, sec. 1. Applies to all employments. (May be suspended in war time by governor on request of Council of National Defense or Secretary of the Interior.)

2. Ten-Hour Laws (Manufacturing Establishments).

Mississippi: Acts, 1912, ch. 157, amended by Acts. 1914. ch. 169, sec. 1 and by Acts. 1916, ch. 547.,

Oregon: Acts of 1913, ch. 102. (Employee may work not more than three hours overtime per day, with pay for time and a half.)

II. RAILROADS.

A. Telegraph and Telephone Operators, Dispatchers, Signal Men, etc.

1. Eight-Hour Laws.

Arkansas: Acts, 1907, Act. No. 282, sec. 1.

Connecticut: Acts, 1909, ch. 242, sec. 1. (Twelve hours in stations open only by day with one operator.

Maryland: Pub. Gen. Laws, 1911, Art. XXIII, sec. 323. (In 12 hours.)

Nevada: Acts of 1913, ch. 283, sec. 2.

New York: Consol. Laws, 1909. ch. 31, sec. 8, amended 1913, ch. 466.

Texas: Rev. Civ. Stat., 1911, Art. 6586; Rev. Crim. Stat., 1911, Art. 1555.

West Virginia: Ann Code, 1913, sec. 3023.

Wisconsin: Stat., 1911, sec. 1816m.

2. Nine-Hour Laws.

Missouri: Acts, 1913, p. 187, sec. 1. (Railroad towermen only.)

Nebraska: Rev. St., 1913, sec. 6088. (Not more than 13 hours in stations operated by day only.)

North Carolina: Acts, 1911, ch. 112, sec. 2. (Not more than 13 hours in stations operated by day only.)

Oregon: Acts, 1911, ch. 137, sec. 2.

United States: Acts, 1906–7, ch. 2939, sec. 2, amended by Acts. 1915–16 (64th Cong., 1st sess.), Act, No. 68. (Not more than 13 hours in stations operated by day only.)

B. Trainmen, etc.

1. Eight-Hour Laws.

United States: Acts, 1915–16 (64th Cong., 1st sess.). Act, No. 252.

2. Ten-Hour Laws.

Michigan: Con. Laws, 1897, sec. 5459. (Within 12 consecutive hours.)

New York: Con. Laws, 1909, ch. 31, sec. 7, am. 1913, ch. 462. (Within 12 consecutive hours.)

3. Hours of Rest Required after Specified Hours of Labor.

(*a*) *Eight hours of rest required after 16 hours of labor.*

Arizona: Acts, 1903, Act 34, sec. 1. (Nine hours rest required.)

Arkansas: Digest, 1904. sec. 6652.

Florida: Gen. Stat., 1906, sec. 2643. (After 13 hours of labor.)

Indiana: Annot. Stat., 1914, sec. 5304.

Kansas: Gen. Stat., 1909, sec. 7129. (Hours of labor must be consecutive.)

3. Hours of Rest Required after Specified Hours of Labor—Continued.

(*a*) *Eight hours of rest required after 16 hours of labor*—Continued.

Michigan: Comp. Laws 1897, sec. 5458. (After 24 hours of labor, trainmen only.)

Minnesota: Rev. Stat., 1913, sec. 3835. (Hours of labor must be consecutive.)

Missouri: Rev. Stat., 1909, sec. 7818.

Montana: Rev. Code., 1907, sec. 1741. (Hours of labor must be consecutive.)

North Dakota: Acts 1907, ch. 207, sec. 1.

Ohio: Gen. Code, 1910, sec. 9007, amended acts 1913, p. 557.

(*b*) *Eight hours of rest after 16 consecutive hours of labor; 10 hours of rest after 16 aggregate hours of labor.*

California: Acts 1911, ch. 484, sec. 1.

Nebraska: Rev. Stat., 1913, sec. 6088.

Nevada: Acts 1913, ch. 283, sec. 2.

New Mexico: Statutes, 1915, sec. 4755.

New York: Cons. Laws, 1909, ch. 31, sec. 7.

North Carolina: Acts 1913, ch. 112, sec. 2.

Oregon: Acts 1911, ch. 137, sec. 2. (After 14 hours of labor.)

South Dakota: Acts 1907, ch. 220, sec. 1.

Texas: Rev. Civil Stat., 1911, sec. 6584.

Wisconsin: Stat., 1911, sec. 1809e. (All employees.)

United States: Acts 1906–7, ch. 2939, amended by acts 1915–16, Act No. 68.

(*c*) *Ten hours of rest after certain specified hours of labor.*

Colorado: Rev. Stats., 1908, sec. 5515. (After 16 consecutive hours of labor.)

Georgia: Code 1910, sec. 2693. (After 13 hours of labor.)

Iowa: Code 1897, Suppl. 1913, sec. 2110–a.

III. STREET RAILWAYS.

1. Nine-Hour Laws.

Massachusetts: Acts 1912, ch. 533, sec. 2. (Within 11 hours.)

2. Ten-Hour Laws.

Louisiana: Acts 1886, act 95, amended acts 1902, act No. 122. (Within 12 consecutive hours.)

Michigan: Com. Laws 1897, sec. 5459. (Within 12 consecutive hours.)

New York: Consol. Laws 1909, ch. 31, sec. 6. (In cities of first and second class hours must be consecutive.)

Rhode Island: Laws 1909, ch. 218, sec. 1. (Within 12 hours.)

South Carolina: Acts 1916, No. 544. (Interurban railways.)

Washington: Codes and Stats., 1910, sec. 6578.

3. Twelve-Hour Laws.

California: Political Code 1906, sec. 3246.

Maryland: Acts 1898, ch. 123, sec. 793.

New Jersey: Comp. Stats. 1910, p. 4990, sec. 57.

Pennsylvania: Digest 1894, p. 1829, sec. 268.

South Carolina: Code 1912, sec. 431. (Interurban railways, 10 hours; see above.)

IV. WORK DONE IN PRIVATE BUSINESS FOR NATIONAL, STATE, OR MUNICIPAL GOVERNMENTS.

1. EIGHT-HOUR LAWS.

United States: Act of Congress, August 1, 1892, amended by ch. 106, acts 1912–13, sec. 3738; acts 1911–12, ch. 174.
Alaska: Acts of 1913, ch. 7, secs. 1 and 2.
Arizona: Constitution, Art. XVIII.
California: Penal Code 1906, sec. 653c; acts 1917, ch. 52.
Colorado: R. S. 1908, sec. 3921.
Hawaii: Rev. Laws 1915, sec. 161.
Idaho: Acts 1911, ch. 131, sec. 1, amended 1913, ch. 165.
Indiana: Annot. Stats., 1914, secs. 7977, 7978.
Iowa: Acts of 1917, ch. 183. (State printing and binding; number of hours fixed by typographical union.)
Kansas: Gen. Stats., 1909, sec. 4643, amended ch. 220, Acts 1913.
Kentucky: Stats. 1915, sec. 2290b.
Maryland: Pub. Local Laws 1888, art. 4, sec. 31a, amended Acts 1910, ch. 94, p. 642. (Applies only to Baltimore.)
Massachusetts: Acts 1909, ch. 514, sec. 37; Acts 1911, ch. 494, amended by Acts 1916, ch. 240.
Minnesota: Rev. Stats., 1913, sec. 3832.
Missouri: Acts 1913, p. 420, sec. 237. Applies only to cities of second class.
Montana: Constitution, art. 18, sec. 4; Rev. Codes 1907, sec. 1739, amended 1917, ch. 30; Acts 1917, ch. 172.
Nevada: Rev. Laws 1912, sec. 6778; Acts 1917, ch. 205.
New Jersey: Acts 1911, ch. 243, sec. 1; Acts 1913, ch. 253, sec. 1.
New Mexico: Constitution, Art. XX, sec. 19.
New York: Consol. Laws 1909, ch. 31, sec. 3, amended by 1913, ch. 494, and by 1916, ch. 152.
Ohio: Const. Amendment, 1912, Art. II, sec. 37. Gen. Code 1910, sec. 17–1, added by Acts 1913, p. 854.
Oklahoma: Constitution, Art. XXIII, sec. 1; Rev. Laws 1910, secs. 3757, 3758.
Oregon: Acts 1913, ch. 1, secs. 1 and 4; ch. 61, amended by 1917, ch. 98.
Pennsylvania: Brightly's Digest, 1893–1903, Act. No. 379.
Porto Rico: Rev. Stats. 1911, sec. 1658; Acts 1913, Act No. 140.
Texas: Acts 1913, ch. 68, sec. 2.
Utah: Constitution, art. 16, sec. 6; Comp. Laws 1907, sec. 1336.
Washington: Codes and Statutes 1910, sec. 6573.
West Virginia: Ann. Code, 1913, secs. 713, 714.
Wisconsin: Stats. 1911, sec. 1729m.
Wyoming: Acts 1913, ch. 90, sec. 1

V. PUBLIC EMPLOYMENT.

1. EIGHT-HOUR LAWS.

United States: Act of Congress, Aug. 1, 1892, amended ch. 106, Acts 1912–13, sec. 3738.
Alaska: Acts 1913, ch. 7, sec. 1.
Arizona; Constitution, Art. XVIII.

1. EIGHT-HOUR LAWS—Continued.

California: Constitution, art. 20, Penal Code 1906, sec. 653c; Acts, 1917, ch. 35.

Colorado: Rev. Stats. 1908, sec. 3921.

Connecticut: Acts 1911, ch. 282, sec. 1. (Mechanics in State institutions.)

Hawaii: Rev. Laws 1915, sec. 161.

Idaho: Constitution, art. 13, sec. 2; Acts 1911, ch. 131, sec. 1; amended ch. 165, Acts 1913.

Indiana: Annot. Stats. 1914, secs. 7977, 7978.

Kansas: Gen. Stats. 1909, sec. 4643, amended by ch. 220, Acts 1913.

Kentucky: Stats. 1915, sec. 2290b.

Maryland: Pub. Local Laws 1888, art. 4, sec. 31a; amended ch. 94, p. 642, Acts 1910. (Applies only to Baltimore.)

Massachusetts: Acts 1909, sec. 37; Acts 1911, ch. 494, amended by Acts 1916, ch. 240; Acts 1914, ch. 623.

Minnesota: Rev. Stats. 1913, sec. 3832.

Missouri: Acts 1913, sec. 237. (Applies only to cities of second class.)

Montana: Constitution, Art. 18, sec. 4, Rev. Codes 1907, sec. 1739, amended by Acts 1917, ch. 30; Acts 1917, No. 172.

Nevada: Rev. Laws 1912, sec. 6778, Acts 1917, ch. 205.

New Jersey: Acts 1911, ch. 243, sec. 1.

New Mexico: Constitution, Art. XX, sec. 19.

New York: Consol. Laws, 1909, ch. 31, sec. 3; amended by ch. 494, Acts, 1913, and by Acts, 1916, ch. 152.

Ohio: Constitutional amendment, 1912, Art. II, sec. 37; Gen. Code, 1910, sec. 17–1; Acts, 1913, p. 854.

Oklahoma: Constitution, Art. XXIII, sec. 1; Rev. Laws, 1910, secs. 3757, 3758.

Oregon: Lord's Ore. Laws, 1910, sec. 5060; Acts, 1913, ch. 1, sec. 4; Acts, 1913, ch. 61, amended by 1917, ch. 98.

Pennsylvania: Brightly's Digest, 1893–1903, Act No. 379.

Porto Rico: Rev. Stats., 1911, sec. 1657; Acts, 1913, Act No. 140.

Texas: Acts, 1913, ch. 68, sec. 1.

Utah: Constitution, Art. 16, sec. 6; Comp. Laws, 1907, sec. 1336.

Washington: Codes and Statutes, 1910, sec. 6572.

West Virginia: Ann. Code, 1913, secs. 713, 714.

Wisconsin: Stats. 1911, sec. 1729m.

Wyoming: Constitution, Art. XIX, sec. 1; Acts, 1913, ch. 90, sec. 1.

APPENDIX C.

EXPERIENCE WITH THE SHORTER WORKDAY.

CONCLUSIONS OF THE BRITISH HEALTH OF MUNITION WORKERS COMMITTEE.[1]

In the preparation of the memorandum on "Hours of work in munition factories" (Memorandum No. 5) the committee seem to have been influenced by consideration of what is immediately practicable regarding the health of the worker in relation to a maximum output, in view of exceptional conditions entailed by the war. It is suggested that an increased number of hours may be obtained by overtime or by a system of shifts and that the committee greatly prefers the latter, although recognizing that it is impracticable to establish shifts universally. The committee's objections to overtime, briefly stated, are: (1) It is liable to impose too severe a strain upon the workers, which adversely affects the rate of production and quality of output during the whole period of work as well as during the hours of overtime; (2) it frequently results in a large amount of lost time, which is attributed to workers becoming exhausted and taking a rest, and also to sickness; (3) it imposes a very serious strain upon the management, the executive staff, and foremen. since they can not take days off, like the ordinary worker; (4) it is liable to curtail unduly the period of rest and sleep available for those who have to travel long distances to and from their work, a matter of special importance in the case of young persons: (5) the fatigue entailed increases the temptation to men to indulge in the consumption of alcohol.

Admitting that overtime must continue, the committee suggested definite restrictions to govern it. For adult male workers the committee recommends:

1. The average weekly hours (exclusive of meals) should not exceed 65 to 67, including overtime. Hours in excess of 65 should only be worked for short periods and to meet sudden and unexpected circumstances. It may be desirable to differentiate to some extent between different kinds of work, and to fix a rather low limit of hours for work requiring close individual attention.

[1] Bulletin 221 of the United States Bureau of Labor Statistics.

2. Where practicable, the overtime should be concentrated within three or four days in the week, which should preferably not be consecutive.

3. Where overtime is worked, it is specially important that there should be no Sunday work.

As respects women, the committee expresses the belief that the strain of long hours is serious and that conditions of work in excess of the normal legal limit of 60 hours a week ought to be discontinued as soon as practicable, although little objection is seen to such moderate overtime during the week as can be compensated for by an earlier stop on Saturdays. The committee feels that the need for overtime among women and girls is much less pressing than it is for men, and that wherever practicable the system should be abandoned in favor of shifts. Although it is recommended that boys should be allowed to be employed overtime up to the maximum suggested for men, it is thought that every effort should be made not to work boys under 16 more than 60 hours a week.

Although work on shifts involves night work, the committee makes it clear that night work is not to be regarded as a good thing in itself and offers the following objections to the system:

1. It is uneconomical. Though wages are paid at a higher rate, the rate of output, more particularly during the last two or three hours of the 12-hour shift, is generally lower.

2. Supervision is frequently unsatisfactory.

3. Conditions of lighting are seldom as good as in daytime and make fine work more difficult.

4. Workers experience great difficulty in sleeping by day.

5. The unfamiliar meal hour makes it difficult for the workers to consume substantial food, and their digestion is liable to become deranged.

In its special study of "Output in relation to hours of work" (Memorandum No. 12) the object of the committee was to ascertain the hours of employment most likely to produce a maximum output over periods of months or even years. It held that outpnt can not be maintained at the highest level for any considerable period if the conditions were such as to lead to excessive fatigue and to deterioration in the health of the workers. The committee's investigations covered operations of distinctly different character, some demanding heavy manual labor, others of a light, more or less sedentary, nature. It was found that the time schedule producing the maximum output varied with the character of the operation.

The committee found that for men engaged in very heavy labor the maximum hours of actual work yielding the most effective results appear to be 56 or less per week, for men engaged in moderately heavy labor probably 60 per week, while for men and youths

engaged in light labor, such as tending semiautomatic machines, probably 64 hours per week should be the maximum.

As a method of speeding up production, the committee recommended the careful regulation of rest pauses. It was found that the operatives, if left to themselves, took rests at irregular and often unsuitable times, hence it would be much better if the rest pauses were chosen for them. For instance, a 10-minute break in the middle of the morning and afternoon spells during which the operatives remained at their machines, but took tea or other nutriment brought them by boys or by traveling canteens, has been found a valuable aid to output. Some types of work need longer and more frequent rest pauses than others, and the best time can only be determined by experience. After being fixed, they should remain compulsory and rest pauses at other times be checked so far as possible.

The committee's study of "Industrial fatigue and its causes" (Memorandum No. 7) is closely related to its three memoranda dealing with hours of labor. The committee had the benefit of studies of fatigue made by the home office and by a committee of the British Association for the Advancement of Science, and the committee's report may be regarded as the summing up of these various studies of fatigue and its own studies of hours of labor. The committee again emphasize the importance of the regulation of hours and of daily and weekly rests, made with due consideration of the character of the work performed.

The committee in recording their conclusions say:

> The committee are bound to record their impression that the munition workers in general have been allowed to reach a state of reduced efficiency and lowered health, which might have been avoided without reduction of output by attention to the details of daily and weekly rests. The signs of fatigue are even more noticeable in the case of managers and foremen, and their practical results are probably more serious than in the case of the workmen.
>
> It is of great importance to note that a special and strenuous voluntary effort in labor, if it be maintained under a badly arranged time-table of work and rest, does not necessarily bring increased output over a long period, however praiseworthy the intention of effort may be. Under wrong conditions of work, with excessive overtime, it is to be expected, indeed, that some deliberate "slacking" of the workers might actually give an improvement of output over a period of some length by sparing wasteful fatigue, just as the "nursing" of a boat crew over a part of a long course may improve their performance. It can not under such circumstances be said that a workman so restraining himself, consciously or unconsciously, is doing more to damage the output, on the whole, than the employer who has arranged overlong hours of labor on the baseless assumption that long hours mean high output.

RECENT CONCLUSIONS OF THE BRITISH HEALTH OF MUNITION WORKERS COMMITTEE ON THE RELATION OF HOURS TO OUTPUT.

HOURS OF LABOR IN RELATION TO OUTPUT IN BRITISH MUNITION FACTORIES.[1]

In Memorandum No. 20 on "Weekly hours of employment," issued under date of October, 1917, by the health of munition workers committee of the British ministry of munitions, it is urged "that the time is now ripe for a further substantial reduction in the hours of work." In view of the importance of this subject in connection with labor conditions in the United States, the text of this memorandum is given herewith in full.

WEEKLY HOURS OF EMPLOYMENT.

MEMORANDUM No. 20.

1. The committee have had under consideration the recommendations made in regard to the maximum weekly hours of employment of men, women, and young persons, which were set out in their Memorandum No. 5 on "Hours of work" (issued January, 1916). When the committee commenced their labors, two years ago, they were faced with an almost complete absence of any scientific data as to the relation of hours of employment to output. They had accordingly to rely upon the general evidence of employers, workers, and other persons of experience. As explained in Memorandum No. 1 on "Sunday labor," this evidence was practically unanimous as to the need for a weekly period of rest. There was, however, revealed a marked divergence of opinion as to the limits within which weekly hours of employment should be kept. It was a matter of urgent importance that some guidance on this subject should be offered forthwith. On the other hand, it was clear that in the absence of exact and reliable data any recommendations put forward at that time must necessarily be tentative and provisional in character. Moreover, if they were to be of practical value and to secure any wide measure of acceptance it was necessary that they should satisfy two essential conditions. First, they had to be such as would be regarded as reasonable and moderate by the great mass of employers and workers, and in the second place, while taking account

[1] Health of munition workers committee, ministry of munitions. Memorandum No. 20. Supplementary to Memorandum No. 5 (hours of work). Weekly hours of employment, October, 1917 [Cd. 8801]. 7 pp. Price, 1d. net.

Of the previous memoranda on the subject of hours of labor and output, the following are reproduced in Bulletin 221 of this bureau: Memorandum No. 1, Sunday labor; Memorandum No. 5, Hours of work; Memorandum No. 12, Statistical information concerning output in relation to hours of work (report by H. M. Vernon, M. D.) In Bulletin 230 are reprinted portions of an interim report (February, 1917) of the Health of Munition Workers Committee, which relate to "The comparative efficiencies of day work and night work in munition factories" and "The causes and conditions of lost time," the latter by Thomas Loveday, M. A. A summary of Memorandum No. 18, "Further statistical information concerning output in relation to hours of work, with special reference to the influence of Sunday labor," is given in the Monthly Review for November, 1917, pp. 61 and 62.

of the probable duration of the war, they had to have regard to the immediate urgency of output at the time. Any recommendations which might involve even a temporary diminution of output would have been doomed to failure. It was evident, in fact, that any reduction of hours proposed must be gradual, and the committee accordingly based their recommendations on what appeared to be immediately practicable rather than on what was ultimately desirable or might be defensible on a physiological basis. Further, they found it necessary to confine themselves to suggestions as to the maximum limits within which employment should be restricted, and they did not endeavor to set out the extent to which, in their opinion, it was necessary or desirable to reduce these limits to meet varying industrial conditions.

2. The committee are of opinion that their cautious action and advice has been justified by events, and they are glad to take the present opportunity of recognizing the sympathy with which their recommendations were received, as well as the active and continuous efforts which have been made by the departments concerned to secure their general adoption. The limits of the weekly hours of employment then suggested were—

(*a*) For men, that the average weekly hours of employment should not exceed 65–67 (exclusive of meal times), i. e., a 13–14-hour working day.

(*b*) That boys under 18 should be allowed to work the same hours as men, provided that—

(1) The hours of boys under 16 should be limited to 60, so far as possible.

(2) Substantial relief at the week ends should be insisted on.

(3) Night work should be limited, as far as possible, to boys over 16.

(*c*) That for women and girls employment should be restricted within the normal legal limit of 60, i. e., a 12-hour working day, though within these limits moderate daily overtime might be allowed, and that the employment of girls under 18 at night should be limited as far as possible.

3. The committee are of opinion that the time has now come when these recommendations may properly be reviewed in the light of the following facts: First, the experience gained and the new evidence collected during the past two years; secondly, the strain involved by three years of war conditions, a strain which is likely still to continue for a considerable period; and, thirdly, the rapid increase in the number of women workers and in the variety of processes on which they are employed.

4. From the commencement of their work the committee have attached the highest importance to the collection of exact data affecting the problems at issue. The field to be covered is a very wide one, while the process of collection is slow and laborious. The committee, however, consider that the data which have already been collected on their behalf by Dr. Vernon and others are of great practical value and merit the most serious attention. The results of these investigations are the more valuable in that they have been undertaken solely in a spirit of scientific investigation and with no preconceived opinions. The selection of factories for inquiry was based solely on the likelihood of reliable data being forthcoming. Further, in none of the operations studied was there any change in the nature of the operation or the type of machinery during the period under review. The data were so chosen as to eliminate any possible disturbance due to increasing skill. There is no reason to suppose that the data quoted below were vitiated by any artificial restriction of output.

5. The results of Dr. Vernon's investigations, which covered a period of over a year, are set out in memorandum No. 18. Although that memorandum has already been submitted to the ministry and published, it appears desirable shortly to set out again the principal results of his investigations in so far as they concern the relation of weekly hours of employment to output. The following are the four sets of data which bear on this subject:

(A) WOMEN TURNING ALUMINUM FUSE BODIES.

	Average weekly hours.		Relative hourly output.	Relative total output.
	Nominal.	Actual.		
First period.....	74.8	66.2	100	100
Second period.....	61.5	54.8	134	111
Third period.....	54.8	45.6	158	109

During the first period Sunday work (eight hours) was done on five out of six Sundays; during the second on three out of eight, the nominal weekly hours in these three weeks being 66.5 instead of 58.5, an average of 61.5; during the third period the timekeeping was bad, the normal weekly hours of work averaging about 55. Dr. Vernon accordingly suggests that with good timekeeping a nominal 50-hour week ought to yield the same actual hours of work (namely, 45.6); that is to say, that for women engaged in moderately heavy lathe work a 50-hour week yields as good an output as a 66-hour week and a considerably better one than a 75-hour week.

(B) WOMEN MILLING A SCREW THREAD.

	Average weekly hours.		Relative hourly output.	Relative total output.
	Nominal.	Actual.		
First period.....	71.8	64.9	100	100
Second period.....	64.6	54.8	121	102
Third period.....	57.3	48.1	133	99

Dr. Vernon explains that the reason why a reduction of hours did not lead to an improvement of total output similar to that in the fuse-body turning operation is that for four-fifths of the total time required to mill the screw thread on the fuse body the operative had no opportunity of quickening her working speed, since she had merely to stand idly watching her machine, whereas the lathe worker had to apply seven different cutting and boring tools in succession to each fuse body, and could quicken up her speed of work at almost every stage.

(C) MEN ENGAGED IN HEAVY WORK.

	Average weekly hours.		Relative hourly output.	Relative total output.
	Nominal.	Actual.		
First period.....	66.7	58.2	100	100
Second period.....	62.8	50.5	122	106
Third period.....	56.5	51.2	139	122

It should be noted that during the third period the nominal weekly hours were about 5–6 less than during the second period. Owing to the cessation of Sunday labor the timekeeping was so much improved that the actual hours of work were greater than during the previous period.

(E) BOYS BORING TOP CAPS.

	Average weekly hours.		Relative hourly output.	Relative total output.
	Nominal.	Actual.		
First period	78.5	72.5	100	100
Second period	61.5	54.7	117	88
Third period	60.5	54.5	129	97

Increase of output in this process, which is largely automatic, could only be attained by a more continuous feeding of the machines throughout working hours.

6. The above data show that a reduction in the weekly hours of actual work, varying from 7 to 20, in no case resulted in more than an insignificant diminution of total output, while on the average it produced a substantial increase. As Dr. Vernon points out, the classification of the operations according to the possibility they offer for speeding up production demonstrates anew the self-evident fact that the alterations of hours may have very different effects in different operations. The exact measure of such alterations can not be predicted; it can only be ascertained by observation and experiment. It appears evident, however, that for processes similar to those examined by Dr. Vernon the weekly hours can advantageously be reduced to a total of from 50 to 55, and he suggests that even lower limits might give an equally good output.

7. Two further points of importance emerge from consideration of these data. In the first place the rate of production changed gradually, and frequently four months elapsed before an equilibrium value was reached. This gradual change appears to nullify the suggestion that the effect upon output of the change of hours was a mere consequence of the desire to earn the same weekly wages as before the hours were shortened. The explanation is rather to be traced to the worker finding unconsciously and gradually by experience that he can work more strenuously and quickly for a short-hour week than for a long-hour week. In the second place, the evidence suggests that a considerable increase in the average hourly output is possible, quite apart from any increased rapidity of working. Thus, as the result of special investigations, Dr. Vernon found that in the case of the first body of workers mentioned above the time lost in commencing and stopping work during the first period averaged 37 minutes as compared with only 26½ minutes during the third period.

8. Prof. Loveday, in his memorandum on the "Causes and conditions of lost time," which is included in the committee's interim report on "Industrial efficiency and fatigue,"[1] also supplies valuable data of a somewhat similar character. In the first place, he points out that the proportion of lost time that is due to sickness and other unavoidable causes is, as a rule, greatly underestimated in factory records and the proportion due to slackness consequently overestimated. In the second place, he expresses the view that long hours,

[1] Co. 8511.

much overtime, and especially Sunday labor exert a pernicious effect upon health, particularly of persons occupied in heavy trades. In paragraph 33 (5) of that memorandum he gives two tables, the first dealing with a body of about 180 men aud the second with between 300 and 400 meu employed on heavy work, their normal hours being from 65 to 70. In both these cases, when comparison is made with the figures of lost time for June, 1915, and for a year later, the fact emerges that there was a material increase iu the amount of lost time and that by far the larger portion of the increase was due to recorded sickness. In both cases throughout recorded sickness represented a noticeably high proportion of the total amount of time lost.

9. Prof. Loveday also devoted considerable space to the examination of figures concerning the amount of tiue lost before breakfast. He concludes:

(*a*) That if early hours be worked, the loss is likely to decrease if the start be later than 6 a. m.

(*b*) That when the total hours of the day-shift week are the same, there are likely to be more hours actually worked without thau with work before breakfast, other conditious being similar.

(*c*) That a reduction of hours may be compensated for or even outweighed by the abolition of early hours, partly owing to reduced absences, partly owing to reduced waste of time, and partly to the greater vigor of work after taking food.

He quotes figures for a number of different factors which confirm these conclusions. He strongly presses the view that food should precede work. He points out the undesirability of hunger work, its bad effect upou health, and the temptation to lose time in the short early spells.

10. There can be little doubt that there is an increasing recognition ou the part of both employers and workers of the broad fact which emerges from the investigatiou of Dr. Vernon and Prof. Loveday, namely, that substantial reduction of hours can be effected without any reduction of output. Whereas at the beginning of the war there was a general belief that longer hours necessarily produced larger output, it has now become widely recognized that a 13 or 14 hours' day for men and a 12 hours' day for women, excepting for quite brief periods, are uot profitable from any point of view. Few, probably, would disagree with the statement coutained in the summary prepared by the Right Hon. G. N. Barnes, M. P., of the recent reports of the commissions ou industrial unrest that—

"There is a general consensus of opinion that Sunday and overtime labor should be reduced to a minimum, that holidays shouid not be curtailed, and that hours of work should uot be such as to exclude opportunities for recreation and amusement."

It must be obvious that auy reduction of hours which cau be accomplished without loss of output is profitable not ouly to the employer, iu that it reduces running expenses, but to the worker, since eveu if his or her daily measure of work involves the same amount of fatigue a longer period is left for recovery and for the enjoyment of adequate sleep and recreation.

11. It must be recognized that the conditions are not the same now as they were in the early days of the war; not only have large numbers of the youngest and strongest workers been withdrawn for military service, but those who remain are suffering from the strain inseparable from a continuous period of long hours of employment. To this must be added the strain caused by family

and other anxieties arising out of the war. While much has been done to improve conditions of employment they are still in many cases far from ideal, notably as regards housing and transit. Further, large numbers of women are now employed on heavy work and on skilled operations involving constant thought and attention, which were considered two years ago to be quite beyond their capacity. It may be true that no serious breakdown of health has as yet been observed among the great mass of the workers, but it can not be assumed that this condition will continue indefinitely. The effects of the strain may even have been already more serious than appears on the surface, for while it is possible to judge roughly the general condition of those working in the factory to-day, little information is available concerning the large number of workers who for one reason or another, and often because they find the work too arduous, are continually giving up their job. This is an important point which is liable to be overlooked, since the supply of labor has hitherto been adequate to fill their places. The irritability and nervousness mentioned by the commissions on industrial unrest are moreover well recognized symptoms of fatigue, while it must not be forgotten that the effects of fatigue are accumulative.

12. After careful consideration of all the circumstances, the committee are convinced that the maximum limits of weekly employment provisionally suggested are too high except for quite short periods, or perhaps in cases where the work is light and the conditions of employment exceptionally good. In the great majority of cases, however, the hours of work should now be restricted within limits lower than those quoted in paragraph 2 above. It is impossible to lay down a single rule as to the best hours in all cases; the best scheme can only be determined after a careful consideration of a number of different factors, e. g.—

(*a*) The strain involved in the work, its character (heavy or light, continuous or intermittent) and the mental demand which it makes upon the worker.

(*b*) The extent to which the pace of the work is governed by the machine.

(*c*) The factory environment—temperature, ventilation, etc.

(*d*) The individual physical capacity of the workers, and their age, sex, and experience.

(*e*) The organization of the factory (including welfare supervision.)

(*f*) The sufficiency and suitability of the worker's food, canteen accommodation, etc.

(*g*) The arrangements of the hours of work (spells, breaks, and pauses.)

(*h*) Conditions outside the factory—e. g., housing and transit.

In arranging the hours of work for a factory, allowance should be made, as far as discipline and organization permit, for the fact that the best hours of employment will not be the same for all processes, even in the same factory.

13. In conclusion the committee desire to urge the view that the time is now ripe for a further substantial reduction in the hours of work. If this be effected with due regard to the varying conditions prevailing in different branches of industry, they are satisfied that reductions can be made with benefit to health and without injury to output.

Signed on behalf of the committee.

GEORGE NEWMAN, M. D., *Chairman.*

E. H. PELHAM, *Secretary.*

OCTOBER, 1917.

FATIGUE AND OUTPUT.[1]

Where the factory day consists of four working periods output is low during two of these, viz, the early morning period and overtime.

During the middle periods of the day output is normally high, but is lowered by the working of overtime. This diminution is often so great that the total daily output is less when overtime is worked than when it is suspended. Thus overtime defeats its own object.

The lowest output of the day is often found in the early morning period at the beginning of the week and in the period of overtime at the week's end. The change appears to be due to the accumulation of fatigue and to the wearing off of the Monday effect (described above).

The Monday effect * * * is not without a definite influence on output. It should be recognized and controlled where maximum output is desired.

In cases where the early morning hours are not worked the unsatisfactory output commonly found in this period appears to be transferred, or not to be transferred, to the succeeding period, according to the particular day of the week concerned. On Monday the suspension of the early morning hours will, as a rule, lower output in the succeeding period. On Tuesday also a lowering will be noticed. On the remaining days of the week the suspension of work during the early morning hours is followed by an improvement in the output of the morning period. The change is due to the greater influence of practice (through restored coordination) early in the week and of rest (through lessened fatigue) later on.

A worker may occasionally show a very high output in the early morning period.

Psychical influences affect output. The output on Saturday, in spite of great fatigue, is often high owing to anticipation of the week-end rest.

Workers may be so greatly fatigued at the end of the week that an extra period of overtime is beyond their powers, and should this be insisted upon an unsatisfactory ouput may be expected. A similar condition may exist on Friday.

Great variations may occur in the output of individual workers at different times. The causes of such variations may be purely personal and temporary, or they may be general and affect groups of workers.

The unsatisfactory output of the early morning period is due partly to loss of coordination. It appears to depend also upon lack of rest, lack of food, and general discomfort. These things arise indirectly from excessive hours of labor.

The unsatisfactory output of the overtime period is due to fatigue.

The early morning period may be regarded as bearing a similar relation to the day as Monday bears to the week. In both cases abstinence from work has produced a disinclination for labor and an inability to carry it out effectively. This is due rather to loss of coordination than to fatigue. Examples of similar loss of coordination may be found in knitting, in typewriting, and in similar processes.

Where no overtime is worked output during the different periods of the day is more equal.

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[1] From second interim report of the British Home Office on an investigation of industrial fatigue by physiological methods.

A worker employed for 10 hours per day may produce a greater output than when employed for 12 hours, the extra rest being more than sufficient to compensate for the loss of time.

A worker employed for 8 hours per day may produce a greater output than another of equal capacity working 12 hours per day.

A group of workers showed an absolute increase of over 5 per cent of output as a result of a diminution of 16⅔ per cent in the length of the working-day.

Another group increased their average rate of output from 262 to 276 as a result of shortening the day from 12 hours to 10, and to 316 on a further shortening of 2 hours.

A group of pieceworkers increased their earnings considerably as a result of a diminution in the length of the working-day.

The suspension of overtime affects especially the output of the morning period.

The suspension of the early morning period increases the rate of output, even after overtime has been suspended.

The time "lost" by factory workers may approach an average of 10 per cent of the working-day. The amount lost varies with the length of the working-day and appears to depend upon fatigue.

Under the conditions studied, neither rate of working nor total output attains a maximum when a 12-hour day is adopted.

Rate of working and total ouput are limited by fatigue rather than by other conditions.

Total daily output may be diminished by the introduction of overtime.

COMMONWEALTH STEEL CO., GRANITE CITY, ILL.[1]

The workmen in the open-hearth department and boiler room were changed in 1912, from a system of two 12-hour shifts to one of three 8-hour shifts. To do this required increasing the number of men in the open-hearth department from 22 to 33, but in the boiler room it was necessary to increase the number of men only from 8 to 10. The hourly wage rates of all the men concerned were increased an average of 20 per cent. Exactly the same products were made under the two systems of working hours.

Under the eight-hour system, in spite of the increase in hourly rates, there was a slight decrease in the cost of production, owing to the higher efficiency of the workers. There were very considerable reductions in the amount of pig iron charged and in the amount of fuel oil consumed. Also the quality of the product was very much improved.

1. The open-hearth department of the Commonwealth Steel Co. consists of four 25-ton basic open-hearth furnaces, three of which only are operated at any one time, and which directly require for

[1] Report on conditions of employment in the iron and steel industry in the United States. S. Doc. No. 110, 62d Cong., 1st sess., Vol. III, p. 187 et seq.

their operation 22 men for two 12-hour shifts, or 33 men for three 8-hour shifts. The plant, as a whole, employs 2,300 workmen.

2. The system was changed on February 5, 1912, from a 12-hour, 2-shift, system six days a week, to three shifts of eight hours each.

3. The number of men on each shift (11 men) remained unchanged in the open-hearth department, while in the boiler room only 10 men were employed on the three 8-hour shifts in place of eight men on the two 12-hour shifts.

4. An increase in the hourly rates for the men employed ranges from 14 to 22 per cent, averaging about 20 per cent.

5. Under the new arrangement, there was a slight decrease in the cost of production, owing to the higher efficiency under the 8-hour system, in spite of the increase in the hourly rates and the number of men employed.

6. Reductions in the amount of extra pig iron charged and in the amount of fuel oil consumed obtained under the new system. These reductions were almost enough to pay for the additional labor employed.

7. Also more accurate results were obtained in the quality of the castings. The physical and chemical specifications were more accurate under the 8-hour system and the percentage of cracked castings was decidedly decreased.

8. The workmen were satisfied with the change, although their earnings were about 20 per cent less under the 8-hour system as compared with the 12-hour system.

The superintendent, in his address before the Foundrymen's Association, made the following statement:

> Therefore, viewed from any conceivable angle, I claim the change is justifiable, and you will do well to make it, so far as your open-hearth furnaces are concerned. As to your boiler firemen, each operating head must decide for himself. In our particular case it appeared to be, and finally proved to be, advisable from every standpoint. Conditions in certain other boiler rooms are very different from ours, practically the entire evaporation taking place during the daylight hours in many of them. Since the results are of some interest, however, I have included the comparisons made in our power plant. Reverting finally to consideration of the steel maker, whose performance under both schedules is made the burden of this argument, the basic principle is absolutely sound, and rests on the incontrovertible fact that you can not expect any man to give you the best that is in him when you keep him employed without intermission for 12 hours per day, seven days per week, at work making a heavy demand upon his mental and physical powers, under conditions of high temperature such as obtain on a furnace floor. To expect the best results under such circumstances is folly, and to continue operating under them, spells, not the title of this paper, but the costly side of the 12-hour shift.

OPEN-HEARTH FURNACES.

	Twelve-hour shift.	Eight-hour shift.
Average amount of extra pig iron charged per heat	556 pounds	424 pounds.
Average amount of fuel oil consumed per heat	1,275 gallons	1,138 gallons.
Average amount of fuel oil consumed per ton of metal charged.	55 gallons	49 gallons.
Average number of cracked castings per heat	0.49	0.37.
Average of longest intervals between reversals of burners during 12 hour periods.	26 minutes	28.7 minutes.
Average of chemical analyses of all heats:		
Carbon	Correct per cent	Correct per cent.
Phosphorus	0.011 per cent	0.011 per cent.
Sulphur	0.022 per cent	0.022 per cent.
Manganese	2 points under	Correct per cent.
Silicon	1 point over	Correct per cent.
Maximum phosphorus in any heat	0.022 per cent	0.018 per cent.
Maximum sulphur in any heat	0.025 per cent	0.025 per cent.
Average physical tests of all heats:		
Yield point per square inch	13 per cent over	15.5 per cent over.
Tensile strength per square inch	5.9 per cent over	5.8 per cent over.
Elongation in 2 inches	4.6 points over	4.1 points over.
Reduction of area	7.9 points over	7.2 points over.
Minimum physical tests of any heat (not combined results of one bar, but individual minimums of results covering all bars):		
Yield point per square inch	2.5 per cent under	7.7 per cent over.
Tensile strength per square inch	4.7 per cent under	1.4 per cent under.
Elongation in 2 inches	5 points under	3 points under.
Reduction of area	8.3 points under	7.6 points under.

The situation is summed up with the following sentence from vol. 3 of the steel report (1910) of the Bureau of Labor Statistics:

The trial of the 8-hour system in the steel foundry shows that the chief immediate results are secured through the fact that the men work together better and give much closer attention to their work when working eight hours than when working 12 hours a day.

WORK WEARINESS AND A THREE-SHIFT SYSTEM.

A LETTER FROM JOHN E. GRANT.[1]

Some months ago, before the war, I substituted a three-shift system in place of a two-shift system on account of shortage of some special machinery. It was so successful that it was retained and extended.

The original two-shift system was made up as follows:

A day shift from 7 a. m. to 5 p. m., with an hour's break—12 noon to 1 p. m. On Saturdays the week ended at 12 noon, and the total normal day-shift week was 50 hours. The night shift ran from 6 p. m. until 7 a. m. next morning. There was a supper hour from 10 p. m. until 11 p. m., and a breakfast half hour from 3 a. m. to 3.30 a. m. The total night-shift week was normally 57½ hours. Also shop production was paid for on piecework and bonus plan, and it was found that the output per man per hour on night shift was 15 per cent to 20 per cent less than on the day shift. The three-shift system which displaced the two-shift system was made up as follows: "A" shift from 7.30 a. m. until 4 p. m., with meal half hour from 12 noon to 12.30 p. m.; "B" shift

[1] Engineering, Vol. C, No. 2599. London, Oct. 22, 1915. (Taken from The Case of the Shorter Work Day, pp. 652–653.)

from 3.30 p. m. until 12 midnight, with meal half-hour from 7.30 p. m. to 8 p. m.; "C" shift from 11.30 p. m. until 8 a. m. next day, with meal half hour from 3 a. m. to 3.30 a. m. The shifts for the week finish:

"A" shift, 4 p. m. Saturday.

"B" shift, 12 midnight Saturday.

"C" shift, 8 a. m. Sunday.

Any worker may obtain leave away on Saturday afternoons by obtaining a substitute willing to take his place from one of the other shifts, and we have no trouble from what appears at first sight to be a formidable obstacle.

There are thus three-shift weeks of 48 hours each, a total of 144 hours, compared with the two-shift weeks of 50 hours and 57½ hours—a total of 107½ hours; or, in other words, we obtain an increase in the normal weekly working hours of 34 per cent. In actual fact it is worth more than this, as the output per man-hour is greater, and we soon found that each man in his 48-hour week was doing as much as he did before in the 50-hour day-shift week, and the output has increased 50 per cent in view of the better value obtained from the night hours.

In the three-shift system we have each shift lapping over the other to the extent of half an hour, or equal to the meal half hour. The half hour is occupied in this way. During the first 15 minutes the incoming worker gets all his work and tools ready and clears up all obscurities before he begins. He then takes over the machine, and for the remaining 15 minutes of the half hour the outgoing worker books in his work and attends to the various small duties necessary to be done before he leaves.

In changing the shifts at the end of every week, "A" shift becomes "C" shift, "B" shift becomes "A" shift, and "C" shift becomes "B" shift.

The shift itself therefore is run at high pressure, and the machine is kept running every possible minute. There is no time to think of weariness, and the workers are cheerful and energetic. * * *

Apart from the benefit of increased output, there is also a gain in economy, due to lesser overhead charges, even when increased maintenance cost, because of more machine hours per week is taken into account.

EFFECT OF REDUCTION OF HOURS UPON OUTPUT IN THE GRANITE INDUSTRY.[1]

I desire to bring to your attention a letter which a large employer of labor has written to the president of a great international union, because it splendidly demonstrates the results of the movement to shorten the working day. It is by William J. Crawford, president of William J. Crawford & Co. (Inc.), one of the leading firms in the granite industry. It is addressed to Mr. James Duncan, international president of the Granite Cutters' International Association, Quincy, Mass. It says [reading]:

[1] Hearings on 8-hour bill (H. R. 27281) before House Committee on Labor, Jan. 30 and Feb. 6–12, 1913, pp. 32–33.

BUFFALO, N. Y., *December 19, 1912.*

MR. JAMES DUNCAN,
International President the Granite Cutters' International Association,
Quincy, Mass.

DEAR SIR: For several months the writer has wished to write to you to explain some facts which we are sure will interest you and your fellow members.

There are few firms in the country who have kept a comprehensive cost system extending over a period of more than 30 years. Just 32 years ago, in January, 1880, we commenced to keep this record of the value of each man and the exact cost of each piece of work, and we have kept this ever since. In the part of this work which will interest you we have a page for each granite cutter, and following each entry of the piece of work he takes up is the day and hour commenced, the day and hour finished, the entire time consumed, the wages we have paid, the quarry bill, and a column for loss and a column for gain. In this way we are able to raise a man's wages from time to time as he proves his worth. We do this without request from the men, and in this way we obtain the highest efficiency, and we can not remember when a man has asked us to raise his wages.

Now, about the fact that I think will be of particular interest to you. This cost system extends back to the time when the day was 10 hours, and it shows that the same man, under identically the same conditions, accomplished more of exactly the same kind of work when he was working 9 hours than he did when he was working 10 hours; and again, when the hours were reduced to 8 hours this same man accomplished still more in an 8-hour day than he did in a 9-hour day, or a considerable amount more than he did when the day was 10 hours long.

My observation of the conditions, and I am with our men from 8 a. m. until 5 p. m., is this: That as men work to-day at the granite-cutting trade an 8-hour day is too long, and I believe that any good granite cutter (and I mean by this a man who uses his brains as well as his muscles every minute) could do just as much work in 7 or even 6 hours as he does in 8. This may sound radical, but from close study I find that 16 hours for "rest and refreshment" to a granite cutter is not sufficient to make him approach his work in the morning in a perfectly rested condition. * * *

Very truly, yours,

WILLIAM J. CRAWFORD,
President William J. Crawford & Co. (Inc.).

OUTPUT IN BATTLESHIP CONSTRUCTION.[1]

In the building of the two battleships, the *Connecticut* and the *Louisiana*, we have a concrete case offering opportunity for the study and comparison, not only of contract versus direct labor, but also of the 8-hour day versus the 10-hour day. The former battleship is

[1] The 8-hour day and Government construction by direct labor, Ethelbert Stewart. Commons, vol. 10, May, 1905. (Taken from the Case for the Shorter Work Day, pp. 679–681.)

being built by direct labor in the United States navy yards in Brooklyn under the 8-hour day and by union men. The battleship *Louisiana* is being built by contract by the Newport News Shipbuilding & Dry Dock Co., of Newport News, Va., employing its men 10 hours a day. In chapter 3 of a report to Congress by the Department of Commerce and Labor we find a comparative statment of the work on these two battleships up to November 1, 1904. The information for this chapter was gathered and compiled by Mr. Frank J. Sheridan, one of the most accurate and painstaking agents of the Bureau of Labor, and his figures may be depended upon. Mr. Sheridan says in his report: "No other factor is considered than the productive ability of the two bodies of men doing exactly the same kind of work, using the same kind of tools, and the same kind of material. It is practically all handwork, as the output of the automatic machines, with their speed limitations in production per hour, does not enter into this work."

The keel of the *Louisiana* was laid February 7, 1903. She was launched August 27, 1904. On the date of launching, the percentage of the hull work completed was 54.5. The keel of the *Connecticut* was laid March 10, 1903. She was launched September 29, 1904. Percentage of hull work completed was 53.59. This is by far more rapid work than has ever been done by contracting firms building battleships heretofore, as it is well understood that there is to be a race between the direct labor in the navy yards and contract labor at Newport News. For instance, the elapsed time between the laying of the keel and the launching of the ship is 568 days for the *Louisiana* and 570 days for the *Connecticut*, whereas in the three battleships nearest the size of these two, the *Georgia* was 1,135 days from the laying of the keel to the launching, the *New Jersey*, 957 days, and the *Virginia* 684 days. These ships have a displacement of 14,948 tons, as against 16,000 tons of the two battleships under discussion.

At the date of launching, the gross weight of the structural material worked upon the *Louisiana*, the contract ship, was 14,295,965 pounds. The net weight worked into the hull was 12,216,154 pounds. The aggregate hours of all employees engaged upon the work was 2,413,888. The structural material worked into the hull of the *Connecticut*, the direct labor ship, at the date of launching, showed a gross weight of 14,173,894 pounds. The net weight of finished material worked into the hull was 11,391,040 pounds. The aggregate hours of employees engaged on this work was 1,808,240. In other words, the number of pounds worked in per hour was, for the

Louisiana 5.0608; for the *Connecticut* 6.2995. The average number of pounds worked in for 10 hours or one day, in the *Louisiana* was 50.608, while the average worked into the *Connecticut* in a day of eight hours was 59.396 pounds. The daily average of men working full time of 10 hours on the *Louisiana* was 500.8. The number of men working full time of eight hours on the *Connecticut* was 470.9. This shows that the average production of a man per hour on the *Connecticut* exceeded by 24.28 per cent the average production per man per hour on the *Louisiana;* which explains why the progress on the *Connecticut*, as shown in the report of percentage of work completed to the Bureau of Construction, has kept pace with the work completed on the *Louisiana*, namely: November 1, 1904, the *Louisiana* reported 60.7 percentage completed, while the percentage of completion of the *Connecticut* on the same date was 63.9 (pp. 284–285).

So far, the claim of labor leaders that the eight hour day is productive of better work and just as much of it in the skilled trades as the 10-hour day, seems to be amply sustained (p. 286).

FOURTH REPORT OF THE NEW YORK STATE FACTORY INVESTIGATING COMMISSION.[1]

Statement of N. I. Stone, former chief statistician United States Tariff Board:

The United States Tariff Board made an exhaustive study of the cost of production in the paper, woolen, and cotton industries. The reason for the creation of the Tariff Board and the object of its investigations was to find the cost of production of various commodities as compared with that in foreign countries, in order to furnish Congress with a measure of protection for American industries against the competition of the cheaper labor of Europe. In every instance, the Tariff Board found that there was no such thing as a cost of production; that costs varied not only in the same industry and in the same city, but in the same plant; last, but not least, that neither the total cost, nor the labor cost varied in a direct ratio with the rate of wages paid.

HIGHLY PAID MEN WORKING 8 HOURS PER DAY ARE CHEAPER THAN LOWER PAID MEN WORKING 12 HOURS A DAY.

Thus in the paper and pulp industry it was found that the labor cost of making a ton of news-print paper in the United States varied from $2.19 to $7.26 per ton.[2]

[1] Fourth report of the New York State Factory Investigating Commission, vol. 8, Feb. 15, 1915. (Taken from The Case for the Shorter Work Day, pp. 797–800.)

[2] United States Tariff Board Report on Pulp and News-Print Paper Industry, 1911.

The most remarkable fact about it was that the mills paying the lowest wages and having a 12-hour day had a higher labor cost per ton of paper than those paying the highest rates of wages and having an eight-hour day.

The solution of this puzzle lies in the chapter of the report dealing with the "Efficiency of equipment in paper mills." Mills were found to vary greatly in this respect. Some had machinery 30 years old, while others boasted of machine and only 82 cents with the new, the same rate of wages being paid to 17 tons in 24 hours, while the newer machines could produce 50 tons. The result was that the machine cost of labor per ton of paper was $1.84 on the old machine and only 82 cents with the new, the same rate of wages being paid to the machine tenders in each case.[1]

But important as the machine equipment is in determining the efficiency of labor, the human equation is subject to no less variation under certain conditions.

When the agitation for the removal of the import duty on news-print paper resulted in an inquiry by a special committee of Congress, a representative of one of the largest paper mill companies in the country pointed to the fact that they had recently reduced the hours of labor from 12 to 8, without reducing the weekly rate of wages, with the consequent increase of 33 per cent in their labor cost. The figures secured by the Tariff Board from the books of several mills, including those to which reference was made before the committee of Congress, showed a reduction in the labor cost per ton of paper from $4.35 to $3.73 in 1909 under the 8-hour system. In other words, an increase in the hourly rate of wages to the extent of 33 per cent not only failed to result in a corresponding increase in the cost of labor per ton of paper, but, strange as it may seem, was accompanied by an actual reduction in cost. While the figures of $4.35 in 1908 happened to be the highest in 10 years, there was not a single year in that decade under the 12-hour system which showed as low a cost as in 1909, the first year under the 8-hour system.[1] On the other hand, when it is remembered that during a large part of the year 1909 the mills were idle, owing to the strike for shorter hours and that costs are usually above normal when a plant is started up after a long period of idleness, there is every reason to believe that the labor cost was still further reduced after 1909.

Yet it can not be said that there was a radical change in the equipment of the mills to which these figures relate, immediately following the introduction of the 8-hour shift. The change was due largely to the increase of the personal efficiency of the workers under the shorter day. The duties of a machine tender in a paper mill consist chiefly in watching the thin sheet of paper as it first appears on the large cylinder of the machine. A slight twist at the outset will result in reams of paper being torn on the cylinder, with a mad rush of all the tenders in an endeavor to set things right and will frequently require a complete stoppage of the machine, all of which greatly increases the cost of production. The fatigue caused by 12 hours of such nervous and physical strain resulted in a much greater proportion of damaged paper and interruption of work than was the case after the adoption of the 8-hour day. With the hours of labor cut down from 12 to 8, the machine tender was relieved from duty during the last 4 hours, when he used to be tired out most and when his alertness and general efficiency were at their lowest ebb. The change

[1] United States Tariff Board Report on Pulp and News Print Paper Industry, p. 79.

in working hours not only enabled him to leave the mill less fatigued than formerly, but with the resting period increased by 4 hours a day, the recuperation was more thorough, so that his alertness of mind and body was greater upon his return to work than it used to be even during the first 8 hours under the old system. With his mind more alert, he was able to detect in time imperfections which formerly escaped his attention. This resulted in so great an increase in the relative time the machines were in actual operation (free from breakdowns and stoppages), accompanied by a reduction in the quantity of damaged paper on which labor had been expended in the preceding stages of production and therefore wasted, that the labor cost of production of paper declined in spite of the increase in the hourly rate of wages (pp. 657–659).

OUTPUT IN RELATION TO HOURS OF LABOR IN A SHOE-MANUFACTURING ESTABLISHMENT.[1]

A recent instance of increased output under reduced hours is especially worthy of attention at this time, when complaint is made of a shortage of labor and when it is of special importance that the greatest output should be secured, not for a day or a week, but for an extended period of time, perhaps several years. The results of an experiment of a shoe manufacturer are shown in a letter reproduced below from an article by John A. Fitch in The Survey, for May 12, 1917.

During the first week of December, 1916, our company voluntarily reduced the hours of labor in its entire system of factories from 55 hours per week to 52 hours per week.

This change was put in effect at a time when the conditions in our factories were such as to furnish excellent data as to the result of such a reduction in hours on the production of a large number of employees.

In the period before the change was made—

1. We had built up production to what was regarded as approximately maximum, each plant having reached a production in excess of any previous period.

2. Each plant was laid out with the maximum number of machines in the space available.

3. There was an employee on practically every machine in the system.

4. Over 95 per cent of the productive pay roll was on standardized piecework.

5. All of the plants were running smoothly under a routing system in which delays due to lack of material were practically zero.

6. No new factories were in process of organization.

7. No material changes were being made in the character of the product.

8. No new machinery or processes tending to increase per capita output materially were being installed; what few changes were being made would tend to increase slightly the productive difficulty of the product.

9. Standard production load was such that "going out early" was almost unknown; here and there a few special departments were working overtime occasionally.

[1] Monthly Review of United States Bureau of Labor Statistics, June, 1917, pp. 841–844.

Our system of factories may be divided into two general classes:

1. Supply factories where material is cut or prepared and fed to the shoe factories.

2. Seven shoe factories where the product is assembled.

As the seven shoe factories are operated under a standard system, the conditions are comparable with those of sister ships in the Navy. Production is routed into and through these factories in what we call "sheets," each sheet constituting a half-day's and 11 sheets a week's production. When the hours of labor were decreased in December, 1916, it was decided to make no reduction in the standard sheet or half-day quota. The plan was to determine after trial what reduction, if any, would prove necessary as a result of the shorter hours.

We have operated under the reduced hours for four months. It has been found unnecessary to reduce standard production; actual production has not decreased. The following table shows the changes made in standard production since the first week in December.

Date.	Factory symbol.	Production changed—		Reason.
		From—	To—	
March, 1917	MC	212	200	To offset increase in a difficult portion of production.
April, 1917	MC	200	212	Former production resumed.
March, 1917	ME	288	275	To facilitate improvement of product.
Do	ML	250	262	Factory gaining in actual production.
February, 1917	MD	288	275	To offset an increase in more difficult part of product.
December, 1916	MN	238	250	Increased production.
	MP	175	175	No change.
	MT	108	108	Do.

Under the production system in use any department falling behind standard production to such an extent as to be one-half day behind schedule would automatically cause what is called a "dropping of sheets" and a reduction in the standard production for the particular factory involved. This event has not occurred; in fact, the writer, who has been in general charge of the production system in this company for over 10 years, believes that at no period in its history have we had so little trouble with the production system as during the winter of 1916 and 1917: this, too, in spite of the fact that we have had more difficulties arising from outside our plants than heretofore, namely:

1. Shortage of material.

2. Railroad traffic disturbances, resulting in unexpected delays in materials.

Our organization would regard the above data as ample to justify the general conclusion that we have lost no production as a result of shortening hours. To reduce it to an absolute certainty, however, we have taken from our actual records data for the two months preceding and the months following the reduction in hours, namely:

1. Actual number of employees on the pay rolls.

2. Actual production shipped.

3. Comparison in the unit representing the productivity per employee per working-day.

These figures cover the combined production of the seven shoe factories (sister assembling plants) and results as follows:

Period.	Total number of employees.	Productive unit per employee per day based on pairs shipped.
October and November, 1916 (working 55 hours)	3,986	8.91
December, 1916, and January, 1917 (working 52 hours)	4,105	9.00
February and March, 1917 (working 52 hours)	4,170	9.02

(*a*) Number of employees includes both productive and non productive; nonproductive pay roll, however, is carefully standardized and changes in it during this period were infinitesimal.
(*b*) Of productive pay rolls 95 per cent plus is piecework.
(*c*) Employees classified by sex: Male, 60 per cent; female, 40 per cent (based on previous estimates, but percentages fluctuate only slightly).
(*d*) During the winter months there were several bad epidemics of colds and grippe, tending to increase production losses from absence.
(*e*) A shortage of available labor made employment conditions difficult.

The writer is firmly convinced from this and other similar experiments that long working hours are not only an economic loss to the community as a whole, but that there is ample evidence to indicate that even inside factory walls there is no net profit in running on a schedule much over eight and one-half hours per day. There are so many complex factors entering into the production of the individual employee and particularly into the production of employee groups that the old theory of proportional production per hour is absolutely untenable.

Our experience has been that overtime work is decidedly undesirable as a method of increasing production. Our policy is to discourage it in all departments. Toward this end we have made it a rule for several years to pay 50 per cent extra for all piece-work done during overtime hours. We permit overtime work ordinarily only under the following conditions:

1. To quickly offset breaks in continuous production.
2. Where only a small number of employees are affected.
3. For short periods.

To sum up, our whole experience tends to justify the shorter-hour movement. We are absolutely convinced that it is right for the community as a whole, because we feel sure it would increase the net productivity of society. We believe it is right for the individual factory unit because we have come to realize that even in an individual plant the real problem is to get the maximum amount of work done by a given thousand people, not in a day, in a week, or in a year, but in a lifetime.

EFFECT OF REDUCED HOURS IN THE BOOT AND SHOE INDUSTRY.[1]

The following data is based on an investigation of 190 establishments employing 98,179 workers. Of these establishments, 94, or 50 per cent, had reduced hours of work in recent years, and 77, or 40 per cent, reported the effect on output. The prevailing hours of the establishments studied ranged from 48 to 60.

The following table gives the important data submitted by those establishments which reported the effects on output accompanying reduction in work hours. For convenience the information is

[1] National Industrial Conference Board. Hours of work as related to output and health of workers: Research Report No. 7, June, 1918. 76 pp.

assembled by hour groups and the establishments classified according to the effect on production. It should be noted that in several cases companies reporting a decrease in production for the establishment as a whole, nevertheless stated that the output of pieceworkers, who on an average constitute about 68 per cent of the working force, was either maintained or not seriously affected.

In examining the data given in the column "Change in wages" the distinction between total wages and rates of wages must be kept clearly in mind. The statement that there was no change in piece or hourly rates when hours were shortened means that the weekly total was reduced for dayworkers and also for pieceworkers unless these increased their output.

Summary comparison of establishments and employees, by hour groups, according to effect on output accompanying reduction in hours.

[National Industrial Conference Board.]

ESTABLISHMENTS.

Nominal hours per week.	Number maintained.	Number decreased.	Per cent maintained by hour groups.	Per cent decreased by hour groups.
Total	24	53	.....	.....
48	1	1	50.0	50.0
49½ and 50	5	28	15.2	84.8
52 and 52½	7	6	53.9	46.1
53	1	.....	(1)	(1)
54	6	13	31.6	68.4
55	3	5	37.5	62.5
56	1	.....	(1)	(1)

EMPLOYEES.

Total	19,619	42,581	.....	.....
48	200	12,000	1.6	98.4
49½ and 50	2,581	20,478	11.2	88.8
52 and 52½	9,140	2,213	80.5	19.5
53	171	.....	(1)	(1)
54	5,904	4,991	54.1	45.9
55	615	2,899	17.5	82.5
56	1,008	.....	(1)	(1)

[1] Percentages not computed because only one establishment included in this group.

Increase or decrease of production is affected by so many influences other than hours, it is impossible to secure specific data as to the output as affected by hours alone. Two of the above companies reporting results of reduction were operating on the 48-hour basis. One of these companies, employing 12,000 workers, reported as follows:

> We are glad to report that in our judgment, so far as it has affected our industry, the 48-hour week has been a positive and satisfactory improvement from every standpoint.

With regard to the experience of this company, the report states:

Numerous welfare activities are maintained by the company, which also frequently purchases large quantities of food and other commodities in times of unusually high prices and distributes them among its employees at cost. Such factors as these, which may easily have a considerable bearing upon the efficiency of workers, must be considered when applying the experience of the company to the industry in general.

The other company reporting results of the 8-hour day on output reduced the working hours in its plant as early as 1898, from 10 to 9, with a resulting increase of production. In 1901 the hours were reduced to 8, with resulting decrease of output. With regard to this company the report points out that "since the company made its experiment with an 8-hour day, many changes in processes of manufacture have been developed, so that the results above outlined are not necessarily representative of those obtainable under a similar schedule at the present time."

The report draws the following conclusions from the data presented:

CONCLUSIONS.

1. A 54-hour week is long enough to maintain production at a practical maximum in the boot and shoe industry as a whole, even under present work conditions.

2. Several well-equipped and well-managed establishments have obtained as large an output from a 52 or 52½-hour week as from a longer one.

3. While a 50-hour week may be feasible for a limited number of establishments, the weight of experience was so unfavorable as to indicate clearly that under present conditions it is not an economic work-week for the industry as a whole. If all such hindrances as inefficient management; irregular hours, short time by pieceworkers, and arbitrary restriction were eliminated, and a genuine spirit of cooperation were secured, it is possible that a 50-hour week would be as productive as a longer one.

4. A 48-hour week will not maintain production at a maximum under present conditions nor without radical changes in operating methods.

These conclusions relate only to factory production, and "do not take account of the question as to whether a work-week which will not maintain such factory production at a maximum, at least for the time being, may nevertheless be justifiable on broad social grounds."

PRODUCTIVITY OF LABOR IN THE ANTHRACITE COAL MINES.[1]

BY PAUL F. BRISSENDEN.

By the terms of the wage agreement entered into on May 5, 1916, the workday in the anthracite coal fields was reduced from nine to eight hours. This change, which constituted an 11 per cent reduction

[1] Monthly Review, Bureau of Labor Statistics, August, 1917.

in working time, went into effect on May 9, 1916. The eight-hour workday, was, therefore, in effect for 7 months and 23 days and the nine-hour workday for 4 months and 8 days during the year 1916, and the nine-hour workday during all of the year 1915.

During the months immediately following the adoption of the eight-hour day there was a considerable reduction not only in output but in the number of men employed in and about the anthracite mines. In fact, there were fewer men employed in the anthracite fields in 1916 than there had been at any previous period since 1904.

Making use of figures furnished by the Federal Trade Commission the Department of Labor has prepared the following table showing the relative production in this industry during the calendar years 1915 and 1916:

Anthracite coal production.

	1915.	1916.
Number of workmen employed:		
Contract miners	41,757	39,390
Contract miners' laborers	32,595	24,957
Other inside labor	44,809	40,806
Outside labor	40,230	37,756
Total	159,391	142,909
Production of coal in gross tons	72,279,944	71,248,807
Average number of days worked	230	253
Man-days worked by miners and miners' laborers	17,067,087	16,180,303
Man-days worked by all labor	35,599,300	34,524,266
Output per man-day for miners and miners' laborers, gross tons	4.08	4.20
Output per man-day for all labor, gross tons	2.03	2.06
Per cent of increased production per man-day, 1916 over 1915, for miners and miners' laborers		2.90
Per cent of increased production per man-day, 1916 over 1915, for all labor		1.40

The figures for a number of workmen employed are based upon reports furnished by 11 railroad coal companies and 24 of the so-called independent coal companies, which together contribute about 90 per cent of the total output of the anthracite field. The average number of days worked is based upon individual reports of the 35 companies considered and the product of this average and the number of workmen employed gives the number of "man-days" worked. The output per "man-day" is obtained by dividing the number of gross tons produced by the number of "man-days" worked.

The number of employees of the 11 railroad coal companies in 1916 was 8.8 per cent less than it was in 1915, and the total labor

force of the 24 independent companies was 19 per cent less in 1916 than in 1915. The whole force of labor employed in the anthracite fields was 10.3 per cent less in 1916 than in 1915. This is a greater proportionate reduction than the reduction in output, which constituted 8.9 per cent for the 12 railroad coal companies. The figures show that the output for the 35 largest anthracite operators, producing over 90 per cent of the entire output, was 72,279,944 gross tons in 1915 and decreased to 71,248,807 gross tons in 1916, showing a decrease of 1,031,137 gross tons, or 1.4 per cent as compared with that of the previous year. For the 11 railroad coal companies this decrease for the whole year constituted only 158,181 gross tons, or 0.3 per cent of their 1915 output, while for the other 24 operators it was 873,056 gross tons, or 7.1 per cent of their 1915 output.

As would be expected, the loss in number of laborers was made up in part by an increase in 1916 of the number of days worked. The 24 independent companies operated their mines 254 days in 1916, as compared with 248 days in 1915, and the railroad companies operated their collieries 246 days in 1916, while they worked only 223 days in 1915. The independents' operating time was thus increased 2.4 per cent in 1916 and that of the railroad companies 10.3 per cent. Among the railroad coal companies there is a wide difference in the percentage of increase in number of days worked. In the case of the Lehigh Coal & Navigation Co. there was an actual decrease in days worked, that company operating in 1916 only 225 days, whereas in 1915 it operated 244 days. All the other companies show an increase in number of days worked, ranging from 3 per cent for the Pennsylvania Coal Co. to 26.1 for the Philadelphia & Reading Coal & Iron Co. In spite of the heavy decrease in the labor supply (8.8 per cent for the 11 railroad coal companies and 19 per cent for the independents), the number of "man-days" worked in the collieries decreased only 2.3 per cent for the railroad coal companies and 18.5 per cent for the independents.

The closest approximation to the productivity of anthracite labor in 1916 may be reached from a study of the output per "man-day." The 11 railroad companies had an output per "man-day" for miners and miners' laborers of 4.14 gross tons in 1916, as compared with 4.12 gross tons in 1915. The 24 independent operators show an output per "man-day" of 4.41 gross tons in 1916, as compared with 3.93 gross tons in 1915. This indicates that there was an increase in the output per "man-day" of 0.5 per cent for the 11 railroad coal companies and 12.2 per cent for the 24 independent companies, these two groups representing at least 90 per cent of the total anthra-

cite output. The corresponding figures for output for all laborers are not quite so favorable. The output per "man-day" for the 11 railroad companies was 1.98 gross tons in 1916 and 2.04 gross tons in 1915, indicating a decrease in output per "man-day" of 2.9 per cent. The 24 independents, however, show a considerable increase, their output for 1916 being 2.17 gross tons and for 1915, 1.97 gross tons, an increase for 1916 over 1915 of 10.2 per cent. Four of the railroad coal companies had an increased output per "man-day" for 1916, as compared with 1915, i. e., 7.9 per cent for the Delaware, Lackawanna & Western Railroad Co., 5.8 per cent for the Pennsylvania Coal Co., 7.5 per cent for the Susquehanna Coal Co., and 3.3 for the Lehigh Coal & Navigation Co.

In view of the fact that the miners' workday was shortened by 11 per cent in all collieries on May 9, 1916, the increased output per man-day is all the more remarkable. It has been noted that there was a decrease of 2.9 per cent in the total per man-day output of the railroad coal companies. Seven of these companies showed a decrease and four an increase in per man-day output. Only in the case of Coxe Bros. Co. did the decrease in output per man-day reach the 11 per cent decrease effected in the length of the workday.

The bulletins of the United States Geological Survey on "The Mineral Resources of the United States" report the average coal tonnage per man per day, by years, from 1890 to 1915, inclusive. The section of their tabular statement on this subject which pertains to anthracite is reprinted herewith.

ANTHRACITE COAL PRODUCED PER MAN EMPLOYED, 1890–1915.

[Source: U. S. Geological Survey, Mineral Resources of the United States. Coal in 1915—Part A. Production, p. 363.]

Year.	Men employed.	Days worked.	Average tonnage per man per day.	Average tonnage per man per year.	Year.	Men employed.	Days worked.	Average tonnage per man per day.	Average tonnage per man per year.
1890	126,000	200	1.85	369	1903	150,483	206	2.41	496
1891	126,350	203	1.98	401	1904	155,861	200	2.35	469
1892	129,050	198	2.06	407	1905	165,406	215	2.18	470
1893	132,944	197	2.06	406	1906	162,355	195	2.25	439
1894	131,603	190	2.08	395	1907	167,234	220	2.33	512
1895	142,917	196	2.07	406	1908	174,174	200	2.39	478
1896	148,991	174	2.10	365	1910	169,497	229	2.17	498
1897	149,884	150	2.34	351	1911	172,585	246	2.13	524
1898	145,504	152	2.41	367	1912	174,030	231	2.10	485
1899	139,608	173	2.50	433	1913	175,745	257	2.02	520
1900	144,206	166	2.40	398	1914	179,679	245	2.06	505
1901	145,309	196	2.37	464	1915	176,552	230	2.19	504
1902	148,141	116	2.40	279					

An examination of these figures shows that more than once since 1890 the tonnage per man per day has decreased from one year to the next by an appreciable amount. Without any change in the working day the tonnage per man per day decreased from 2.35 gross tons in 1904 to 2.18 gross tons in 1905, again from 1908 to 1910 the tonnage per man per day decreased from 2.39 to 2.17 gross tons, and this decrease continued in 1911, 1912, and 1913, being 2.13, 2.10, and 2.02 gross tons, respectively, in the years mentioned.

The foregoing evidence in regard to the effect of the eight-hour day upon the productivity of the mines is reinforced by the testimony of the anthracite operators. At a recent conference with the Federal Trade Commission they testified that it was their belief that the efficiency of the anthracite mine worker had not been diminished, but on the contrary had probably been increased to a slight extent since the introduction of the eight-hour day. They said, however, that it could not be inferred from this increase in production per man-day that there had been a corresponding increase in efficiency, because the increase in productivity per man-day was very largely due to the fact that the miner in 1916 did his work under much more favorable conditions than in 1915. Because of the shrinkage in the labor force and the unusually strong demand for coal it was necessary to confine operations as far as possible to the thick veins, and in general to work chiefly in those veins from which the greatest amount of coal could be taken in the shortest possible time.

It is interesting to note that the total anthracite production in 1917 is materially in excess of the production for 1916. According to figures furnished by the Anthracite Bureau of Information the production in May of this year was 6,917,525 tons, as against 5,547,899 tons for May of last year, and the production in 1917 up to and including May was 30,618,056 tons, as against 27,784,690 tons for the same period last year.

In conclusion, the evidence seems to be decisive that such decrease in productivity as did occur during the months following the introduction of the eight-hour day was due to a marked falling off in the number of employees and not to the shortening of the workday. Judging from the figures given it appears that no gain in production would result from increasing the hours of labor in the anthracite mines at the present time. If greater production is to be obtained it would seem that some other method than increasing the number of hours per day must be devised.

EFFECT OF REDUCTION OF HOURS UPON PRODUCTION IN A TOOL-MANUFACTURING ESTABLISHMENT.[1]

The experience of a tool manufacturer, making high-grade tools, in reducing labor turnover, eliminating lost time, and, with a reduction of hours of about 9 per cent, securing an increase in production of 10 per cent, has been told by John M. Williams, secretary of Fayette R. Plumb (Inc.), of Philadelphia, in an address entitled "An Actual Account of What We Have Done to Reduce Our Labor Turnover," delivered before the Philadelphia Association for the Discussion of Employment Problems, March 5, 1917. Before presenting the results of the experience of this company, it is necessary to say, in order to afford opportunity for properly judging the results, that the firm is over 60 years old and has been engaged from the beginning in making high-grade tools. A cost system had been installed in the factory at great expense and was regarded as most efficient in securing results. It is stated that such changes as were brought about were not due in any degree to the fact that the employees were low grade or underpaid.

Of the several results accomplished by the establishment, only the second relating to the effect of the reduction in hours upon output is here reproduced in the words of the secretary of the firm.

Second.—Reduction in hours from 57½ hours to 52½ hours.

During the period when men were so hard to get we tried to analyze the cause for men either not hiring with us or not staying with us and the employment department made the following report as to one of the contributing causes, viz:

"Our work from its very nature is hard and laborious, tiring men out, compared with work in the average factory.

"We figure that in order to hold our men, and make our plant attractive to new men it is necessary to reduce our week from 57½ hours to 52½ hours, with no reduction in pay.

"We figure it will not decrease our production, but will raise it."

After some discussion their report was adopted, and on December 4, 1916, all day rates were raised so that the pay equaled or slightly bettered on a 52½-hour basis the old pay on a 57½-hour basis.

All piece rates were carefully analyzed and adjusted in every case where the shorter hours affected the pay of the producers.

The results speak for themselves. The men felt better and appreciated our action. It is much easier to hire men than before.

The weekly production is one of our worst departments in spite of the shorter hours has increased 18.4 per cent and in the entire plant 10 per cent.

[1] Monthly Review of United States Bureau of Labor Statistics for June, 1977, pp. 844–845.

REDUCED HOURS AND THE OUTPUT OF STEEL FORGINGS.[1]

On January 2 last, after consultation with the leading workmen, notice was given that the works would, on March 1, be put on the basis of a 9-hour day with 10 hours pay, running 54 hours weekly for the wages theretofore paid for 60 hours. This concession, made voluntarily and unasked, was received cordially by the men, who have shown their appreciation by working closely up to the full 9 hours. Experience thus far has shown the 9-hour day to be profitable, for the output of the works is slightly larger than before. A comparison of a large number of orders executed on the 9-hour basis with the same number of orders for the same goods executed under similar conditions on the 10-hour basis shows a slightly average gain in favor of the 9-hour day. There is a slightly larger average output for the 9-hour day than for the 10-hour day, though in every other respect the work was done under similar conditions. There is throughout an increased rate of hourly output and a total output somewhat larger for the shorter working time.

The 9-hour day has been a gain and not a loss—demonstrably so where exact data can be had, satisfactorily so even where the full details can not be secured. This result is believed to depend in large degree upon the willing and helpful spirit that exists in the works * * *.

J. H. Williams & Co. believe that such success as has been obtained arises largely because and not in spite of the high and continuous wages paid to their working force, and recognize thoroughly the intelligence, efficiency, and, last but not least, the good will of that working force. While none can estimate exactly the difference in production in the same works between a force of men justly treated, earnest and zealous in their work, and a similar force working merely because they must live, the writer believes the difference between these two, under conditions otherwise similar, may be that between ruin and dividends.

Again, it should be said that the things above suggested are done not as charity, but as matters of justice, as privileges, and as sources of profit. The course thus far taken will be followed because it is both a pleasant and a profitable one. It pays because a man is more than a machine, and the policy which treats him as a machine ignores one of the greatest factors in production, viz., human nature. It pays because the rate of wages is not the chief factor in cost, but the rate of production. A clean man produces more in the long run than a dirty man. A well-informed man produces more than an ignorant man. A justly treated man produces more than an unjustly treated man. A contented man is a better and cheaper producer than a discontented man. A well-paid man is a more economic producer than an ill-paid man. It would often be well, when seeking to economize, to give less attention to the pay roll and more in other directions.

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[1] Report of the United States Industrial Commission, Vol. XIV. 1901. Mr. William C. Redfield, treasurer, J. H. Williams & Co. (Taken from The Case for the Shorter Work Day, pp. 677–679.)

HOURS OF WORK AS RELATED TO OUTPUT IN COTTON MANUFACTURING.[1]

The National Industrial Conference Board (Boston, Mass.), an organization maintained by certain employers' associations, made an investigation in 1917 into the effect of reduced hours upon output in cotton manufacturing. Information was obtained from 166 establishments employing 116,000 workers; 109 establishments employing 82,036 workers are located in the North, and 57 establishments employing 34,347 workers are in the South. In addition to these, six factories in the North which did not file schedules were visited by field workers. They employed, approximately, 21,000 operatives, making a total of 103,036 Northern workers, or about 48 per cent of the total for this section as reported by the United States Census of Manufactures (1914). Many of the figures given relate to the period 1911 and 1912 when conditions were wholly different from what they are at the present.

Schedules returned by manufacturers show that the prevailing hours of work in the Northern cotton mills are 54 and under 56 hours per week, while the prevailing work week in Southern cotton mills was 60 hours. The Saturday half-holiday was found to be almost universal.

Cotton mill work, it is pointed out, is automatic; high speed machinery is employed; many women and minors are engaged in it; and the nationality of the labor force is somewhat shifting.

HOURS AND OUTPUT.

The report notes a number of difficulties encountered in securing comparable data—great range in size (counts) and strength (twists) of yarn and the great variety of weaves in cloth; idleness of many of the looms because of lack of work or change from one weave to another; atmospheric and climatic conditions affecting the cotton fiber; and the fact that changes in the hours of work in many of the Northern mills were made early in 1912, making it quite out of the question to compare figures of output in 1917 under a 54-hour

[1] Hours of work as related to output and health of workers, cotton manufacturing. Research Report No. 4. March, 1918. National Industrial Conference Board. Boston, 1918. 64 pp.

The National Industrial Conference Board "is a cooperative body composed of representatives of national industrial associations and organized to provide a clearing house of information, a forum for constructive discussion, and machinery for cooperative action on matters that vitally affect the industrial development of the Nation."

schedule with those in 1911 under a 65-hour schedule as a measure of the effect of the reduction in hours on output. It is not generally stated what effect such factors as changes in efficiency and speed of machinery, changes in efficiency in management, and changes in the character of the working force during the period under investigation may have had upon output. These factors have not been segregated or considered in their effect upon the output, except in those instances where it was found that output was maintained or increased under reduced hours; if output was decreased under reduced hours it is not stated whether the factors mentioned played any part in that result.

Of 95 Northern mills (73,417 workers) reporting a reduction in hours, only six (5,640 workers) stated that production was maintained when hours of work were reduced, while 64 (43,545 workers) indicate a falling off in output. The report calls attention to the fact that even this rather exceptional showing as respects maintenance of output may be explained by special considerations brought out in statements from the employers, namely, that several of the mills were manufacturing special lines of products, that in one case there was change in management, and in two cases the reduction in hours was very slight. As to the 64 establishments reporting a decrease in output under shorter hours, it appears that in most cases the reduction in output was stated to be about proportional to the reduction in hours.

Whether, as already explained, the number and character of the employees remained the same; whether the management remained equally efficient or was in any manner changed during the period of the experiment is not stated in this connection, nor the effect which this would have upon the cost of production.

In 20 Southern mills reporting on reduction in hours, four (1,797 workers) stated that production had been maintained, while 16 (13,162 workers) stated that there had been a decrease in output under a reduction in hours from an average of about 63.8 to 59.4 per week. The effect on output accompanying a reduction in hours in both northern and southern establishments is set forth in the following table as given in the report:

EFFECT OF REDUCTION OF HOURS ON OUTPUT.

Effect on output accompanying reduction in hours.	Establishments.		Employees.		Average hours per week.	
	Number.	Per cent of total.	Number.	Per cent of total.	Before reduction.	After reduction.
Northern mills:						
Output maintained	6	6.3	5,640	7.7	57.3	54.5
Output decreased	64	67.4	43,545	59.3	57.2	53.4
Effect not reported	25	26.3	24,232	33.0	56.5	54.1
Total	95	100.0	73,417	100.0		
Southern mills:						
Output maintained	4	11.4	1,797	8.2	65.5	60.0
Output decreased	16	45.7	13,162	59.7	63.8	59.4
Effect not reported	15	42.9	7,083	32.1	64.7	59.7
Total	35	100.0	22,042	100.0		

Reduction in hours of work in northern cotton mills from 58 or 56 to 55 or 54 have, according to the report in a great majority of cases, resulted in "an approximately proportional reduction in output." Because of the large number of influences involved, a precise measurement of the effect of any one is almost impossible, but the evidence establishes that the reductions in hours were largely responsible. In some instances a part of the loss, it is stated, was promptly made up by increased efficiency of workers, but this experience was not general. Eventually improvements in equipment, in methods of management, and in other respects, often brought total output per employee up to that previously attained under a longer week. This, however, necessitated a material increase in investment.

Such limited data as are available for southern mills indicate that hours in excess of 60 per week do not necessarily yield a materially larger output than do 60 hours. Reductions below a 60-hour schedule, however, it is stated, usually resulted in substantial decreases in output. At the same time it is observed that "the margin of lost time appears to be considerably larger" in the southern than in the northern cotton mills. But what effect this may have upon the cost of production is not stated.

ACTUAL RESULTS OF PRODUCTION UNDER REDUCED HOURS OF WORK IN VARIOUS MANUFACTURING ESTABLISHMENTS.[1]

The portion of the investigation which was especially directed to an examination of the results of the operation of manufacturing estab-

[1] Eight Hours for Laborers on Government Work. Report by the Hon. Victor M. Metcalf, Secretary Department of Commerce and Labor, on H. R. 4064 (eight-hour bill), 1904, pp. 61–109.

lishments which had within recent years made a reduction in hours of work and could make a definite comparison of results after the reduction with results in the same establishments before reduction covered in all 396 establishments. The schedule of inquiries used in securing data for this comparison has already been given and need not be repeated here. The main points of the comparison, it may be said, related to cost of manufacture and to quantity of product per employee, and whether, where the quantity of product fell off, a greater number of work people was employed or an increase was made in the number of days in the year on which the work was carried on.

It was the purpose in the investigation to seek manufacturing establishments operating on the eight-hour basis in whatever industry they might be found and to ascertain the effect in actual practice of the decrease in working hours upon such matters as wages, cost of manufacture, quantity of product, number of employees, and days of running time. Such establishments were known to be numerous in cigar making, stone and granite cutting, and the building (and allied) trades. But the number of establishments, outside of the industries named, which had adopted the eight-hour day was known to be small. Manufacturers generally do not accept the result in these industries as fairly representative of manufacturing. Conditions, they claim, are quite different in the factory, the machine shop, the blast furnace, the shipyard, and in manufacturing generally. Competition in both home and foreign markets is more severe—the margin of profit in most industries is small.

The number of eight-hour establishments being so small, data for comparison were also sought where a reduction from 10 to 9 hours per day or any other substantial reduction had been made and a definite statement could be given of the results under the shorter day and under the previous longer workday. A reduction, such as from 10 to 9 hours per day (or 60 to 54 hours per week), could not, it was realized, be looked upon as indicating accurately the results to be expected from a further reduction to eight hours per day. At the same time, in the absence of a considerable number of establishments which had tried the eight-hour day, such instances were considered as worthy of study.

In following out the investigation as above indicated 396 establishments were found in which a reduction in hours had been made and a statement of the results as compared with the results under the

longer workday previously in force could be given. These were engaged in 83 different industries. The reduction in hours affected 129,102 employees, while 17,039 persons employed in the same establishments had no reduction in hours.

Of the 83 industries the more important are given in the following table:

Industry.	Number of employees.	Number of establishments.
Bituminous coal mining	3,496	4
Boots and shoes	8,944	11
Building trades	6,175	25
Clocks and watches	7,150	3
Electrical apparatus and supplies	9,201	5
Foundry and machine-shop products	35,598	119
Shipbuilding	9,425	7
Total	79,989	174

Of the 396 establishments, 47, or 11.9 per cent, made a reduction to the eight-hour day (48 hours per week), 57, or 14.4 per cent, made a reduction to less than 48 hours, and 292, or 73.7 per cent, made a substantial reduction, but still had a workday longer than eight hours. The greater part of those working less than 48 hours per week were in the building and allied trades, and the very short day is due to the Saturday half holiday which is so common in the larger cities. Thus the 44-hour week is the eight-hour day with a Saturday half holiday. The 54-hour week (nine-hour day was reported in 216 establishments, or 54.5 per cent of the whole number, a shorter week in 154 establishments, or 39 per cent, and a longer week in but 26, or 6.5 per cent.

The number of establishments reporting a reduction to the nine-hour day (54 or 53 hours per week) are practically all in two classes, from 60 to 54 per week, 175 establishments, and from 59 to 54 per week, 30 establishments. The 216 establishments represent a great variety of industries.

The following table permits a study to be made of daily wages as affected by the reduction in hours of labor. It shows for the establishments classified, according to the amount of the reduction in hours of labor per week, the number of establishments reporting no change in daily wages, the number reporting a decrease in daily wages, and the number reporting a decrease in daily wages of the same per cent as the reduction in hours, the number a smaller per cent, and the number a larger per cent.

CHANGES IN DAILY WAGES ACCOMPANYING THE REDUCTION IN HOURS, ACCORDING TO THE AMOUNT OF THE REDUCTION IN HOURS.

Reduction in hours per week of—	Establishments reporting no change in daily wages.	Establishments reporting a decrease in daily wages.			Establishments reporting an increase in daily wages.	Total establishments.
		Same per cent as reduction in hours.	Smaller per cent than reduction in hours.	Larger per cent than reduction in hours.		
Under 3 hours	2					2
3 or under 4 hours	8		1		1	10
4 or under 5 hours	13	1	1		1	16
5 or under 6 hours	43	1	2	3	3	52
6 or under 7 hours	183	5	7	1	24	220
7 or under 8 hours	8				2	10
8 or under 9 hours	2				1	3
9 or under 10 hours	40				7	47
10 hours or over	17	1	14	1	3	36
Total	316	8	25	5	42	396

It will be seen from the above table that of the 396 establishments investigated 316, or 79.8 per cent, reported no reduction in daily wages resulting from the reduction in hours of labor. In 25 other establishments the reduction in the daily wages was a smaller per cent than the accompanying reduction in hours, while in only 13 cases was the wage reduction proportional to or greater than the reduction in hours. In 42 establishments, or 10.6 per cent, an increase in daily wages was made at the time of the reduction in hours of labor. In the table above these facts are given arranged according to the amount of the reduction in hours.

The effect of the reduction in hours per week upon the cost of manufacture is shown in the following table, the establishments being presented by the hours of reduction classified. Under each group are also shown the number of establishments in which no increased cost resulted and the number in which there was an increased cost, with the per cent of the increase. In this table are included only those establishments in which the result was said to be due entirely to the changes in hours and wages, and not in any respect to such modifying causes as higher speeded or improved machinery, changes in methods of work, etc.

According to the statements which were made by manufacturers in connection with the reports relating to the effect of the reduction of hours of labor in their establishments upon cost of manufacture and the quantity of product per employee, it appeared that about 40 per cent of the manufacturers based their statements upon careful keeping of cost figures both before and after the change, while

the remainder of the manufacturers spoke from a general familiarity with their business.

EFFECT OF REDUCTION IN HOURS PER WEEK UPON COST OF MANUFACTURE.

[In all cases here given it was reported that the result was due entirely to changes in hours of labor, or daily wages.]

Reductions in hours per week of—	Number of establishments with no increase in cost of manufacture.	Number of establishments with increase in cost of manufacture.
Under 3 hours	1	1
3 or under 4 hours		9
4 or under 5 hours	4	9
5 or under 6 hours	[1] 6	35
6 or under 7 hours	16	168
7 or under 8 hours	2	6
8 or under 9 hours		1
9 or under 10 hours	2	45
10 hours or over	6	23
Total	[1] 37	297

[1] Including 1 establishment in which there was a decrease in cost of manufacture.

It will be seen from the above that, out of 334 establishments covered, 37, or 11.1 per cent, found no increase in cost of manufacture resulting from the reduction in hours and such changes in wages as in a few cases were made at that time, while 297, or 88.9 per cent, found that cost of manufacture was increased.

The 297 establishments having an increase in the cost of manufacture are classified as follows:

Those having increase in cost of manufacture:	Number of establishments.
Under 3 per cent	15
3 or under 4 per cent	13
4 or under 5 per cent	14
5 or under 6 per cent	25
6 or under 7 per cent	12
7 or under 8 per cent	17
8 or under 9 per cent	8
9 or under 10 per cent	6
10 or under 11 per cent	81
11 or under 12 per cent	47
12 or under 15 per cent	22
15 or under 20 per cent	23
20 per cent or over	14
Total with an increase in cost of manufacture	297

In similar form is the following table showing the effect of the reduction in hours per week upon quantity of product per employee. As in the preceding table, only those establishments are included in which the result was said to be due entirely to the changes in hours

and wages, and not in any respect to such modifying causes as higher speeded or improved machinery or changes in methods of work, etc.

EFFECT OF REDUCTION IN HOURS PER WEEK UPON QUANTITY OF PRODUCT.

[In all the cases here given it was reported that the result was due entirely to changes in hours of labor or daily wages.]

Reduction in hours per week of—	Number of establishments with no increase in quantity of production.	Number of establishments with a decrease in quantity of production.
Under 3 hours	1	1
3 or under 4 hours	1	8
4 or under 5 hours	2	11
5 or under 6 hours	[1] 5	35
6 or under 7 hours	14	168
7 or under 8 hours	2	6
8 or under 9 hours		1
9 or under 10 hours	2	45
10 hours or over	4	25
Total	[1] 31	300

[1] Including one establishment in which there was an increase of 2.5 per cent in the quantity of product.

This table does not include 3 establishments in which the change in the quantity of product was not reported. In 1 of these establishments the reduction of hours was 5, or under 6, and in 2 other establishments the reduction of hours was 6, or under 7.

It appears from the above table that out of 334 establishments covered 31, or 9.3 per cent, reported no decrease in quantity of product as a result of the reduction in hours and the accompanying changes in wages found in a few instances. On the other hand, in 303 establishments, or 90.7 per cent, a decrease in product did result.

The 303 establishments having a decrease in quantity of production are classified as follows:

Those having a decrease in quantity of product:	Number of establishments.
Under 3 per cent	2
3 or under 4 per cent	1
4 or under 5 per cent	1
5 or under 6 per cent	19
6 or under 7 per cent	8
7 or under 8 per cent	9
8 or under 9 per cent	16
9 or under 10 per cent	5
10 or under 11 per cent	159
11 or under 12 per cent	47
12 or under 15 per cent	5
15 or under 20 per cent	16
20 per cent or over	12
Rate per cent not reported	3
Total, with a decrease	303

Reduction in quantity of product per employee means, of course, a smaller output for the establishment and a smaller business, unless offset by an increased number of employees, a larger number of days of running time at the reduced hours, or improved machinery or methods. Those establishments in which, as a result of the reduction in hours, it was necessary to increase employees or days of running time or both in order to keep up the output, are shown in the following table, classified according to the amount of reduction in hours:

ESTABLISHMENTS REPORTING IT NECESSARY TO INCREASE NUMBER OF EMPLOYEES OR DAYS OR RUNNING TIME TO OFFSET DECREASE IN QUANTITY OF PRODUCT.

Per cent of decrease in quantity of product caused by reduction of hours.	Establishments increasing number of employees, also days of running time.	Establishments increasing number of employees but not increasing days of running time.	Establishments increasing days of running time but not increasing number of employees.	Total.
4 or under 5 per cent		1		1
5 or under 6 per cent		12	1	13
6 or under 7 per cent		4		4
7 or under 8 per cent	1	6		7
8 or under 9 per cent	2	12		14
9 or under 10 per cent		3		3
10 or under 11 per cent	8	108	4	120
11 or under 12 per cent	1	37	1	39
12 or under 15 per cent	1	5		6
15 or under 20 per cent	1	8		9
20 per cent or over	2	14		16
Total	16	210	6	232

The above table does not include 24 establishments 14 of which made no report as to whether or not it was necessary to increase the number of employees or the running time after the reduction of hours; 6 others reported an increase in the number of employees, but failed to give the rate of decrease in the quantity of product; and 4 establishments, in which there was no change in the quantity of product after the reduction of hours, also reported an increase in the number of employees.

Of the 14 establishments making no report as to whether or not it was necessary to increase the number of employees or running time after the reduction of hours, 1 showed a decrease of 7, or under 8 per cent, in the quantity of product; 3 a decrease of 8, or under 9 per cent; 1 a decrease of 9, or under 10 per cent; 4 a decrease of 10, or under 11 per cent; 1 a decrease of 12, or under 15 per cent; and 4 establishments reported that there was no change in the quantity of product after the reduction of hours.

It will thus be seen that out of the 396 establishments investigated in regard to the reduction in hours of labor which they had made, 226, or 57.1 per cent, reported that in consequence of a decrease in output under the shorter workday it had been necessary to increase the number of employees. This includes 16 establishments in which it was necessary to increase, not only the number of employees, but the number of workdays in the year as well. In 6 other establishments it was necessary to increase the number of workdays, but not the running time. In the table above these facts are shown, arranged according to the per cent of decrease in the quantity of product.

ZEISS OPTICAL WORKS, JENA, GERMANY.[1]

The operation of these works was changed from a 9-hour to an 8-hour basis in 1900. In studying the effect of this change upon efficiency, comparison is made between the earnings of pieceworkers during the year preceding the change and the year following. The comparison involves 233 workmen. All were excluded whose output might have been affected by special causes, such as ill health, and also all who had not been in the firm's employ for at least four years and who were not at least 22 years of age. Piece rates remained the same.

Under the 8-hour system, as compared with the superseded 9-hour system, the hourly earnings of pieceworkers increased 16.2 per cent. This represents a greater daily output than before, inasmuch as a pieceworker, piece rates remaining the same, need only increase his hourly earnings 12½ per cent in order to produce as much, and thus obtain the same earnings under an 8-hour day as under a 9-hour day. Moreover, the increase of 16.2 per cent referred to was fairly uniform for different occupations and for workers of different age groups.

ENGIS CHEMICAL WORKS, NEAR LIEGE, BELGIUM.[2]

Engaged in the manufacture of zinc blend and sulphuric acid. Principal employment of labor, oven tending. Started in 1888 with system of two 12-hour shifts. Changed four years later to the plan of three 8-hour shifts. Under the 12-hour shifts there were 10 hours

[1] Abbé, Ernst. Die Volkwerbschaftliche Bedeutung der Verkürzung des industriellen arbeitstages. Jena, 1901. Digest in Goldmark's "Fatigue and Efficiency." New York, 1912. pp. 155–166.

[2] Fromont, L. G. Une experiènce industrielle de réduction de la journée de travail. Brussels, Leipzig, etc., 1906. (Institut Solvay.) Digest in Goldmark's "Fatigue and Efficiency." New York, 1912. pp. 144–155.

of actual work. Under the 8-hour shifts there were 7½ hours of actual work. The furnaces were thus operated 22½ hours out of the 24, as against 20 hours previously.

Within six months after the change was effected the workers had equaled in 7½ hours the previous output of 10 hours, and the daily earnings for 7½ hours' work equaled the amount formerly earned in 10 hours. The total cost of production was reduced 20 per cent and the quality of the output improved. Also it was noted that the morale of the workers, as well as their physique, was raised to a much higher level.

SALFORD IRON WORKS, MANCHESTER, ENGLAND.[1]

Engaged in the manufacture of steam engines, pumping machinery, electrical machinery, etc. Number of employees, 1,200, about one-third being pieceworkers. For the six years prior to 1893 the hours of labor had been 54 per week during the first part of the period and 53 during the latter part. In 1893 a 48-hour week was introduced and careful records kept of costs and output for a year. No change occurred in the character of the work done, and the wages remained the same as before.

At the end of a year's time it was found that the amount of output for the year was slightly greater than the average of the six preceeding years. Savings were affected in "wear and tear," fuel, etc., which balanced an increase of 0.4 per cent in wage cost. The reduction of hours also led to a rearrangement of working time. Previously it had been the custom of employees to have two-meal periods at the plant, breakfast and lunch. With the shorter day the men had breakfast before coming to work. This was regarded as beneficial to the men and to their families as well as to the work.

CLEVELAND HARDWARE CO.[2]

The Cleveland Hardware Co., a concern employing several thousand men, had a regular working day three years ago of nine hours. For years the company had experienced a busy season in the middle of the winter, during which it was customary to work one hour overtime. Three years ago when the time came for going on the 10-hour schedule, the management, which had been studying the matter, decided to run straight through the busy season on the old nine-hour schedule. Superintendents and foremen were horrified. They ex-

[1] "Eight Hours for Laborers on Government Work." A report of the Secretary of Commerce and Labor to the House Committee on Labor. Washington, 1905. pp. 78–81.

[2] From the Survey (New York) for Feb. 2, 1918, pp. 494–495.

pressed the belief that the company would not be able to fill its orders. Nevertheless, the rule was adopted and overtime was abolished. At the end of the year when they checked up results, they found that it had been the year of largest production in the history of the company. The next year when the time for the busy season arrived, instead of trying to meet it with the regular working schedule, the management took an hour off, and the whole force went on the eight-hour day. Again, foremen and superintendents expressed their misgivings and again the workers produced more goods than ever before, exceeding their work of the previous year.

Last winter the Cleveland Hardware Co. carried its experiment one step further. There is a large steam hammer in the plant, which proved inadequate for the handling of all the work to be done. It was decided to install another hammer of similar type. While it was being installed the work was piling up and the men proposed that they work in shifts of six hours each, instead of eight. Only two men are employed on the hammer, so it was not an extensive experiment. It is interesting to note, however, that after taking two hours more from their working day, each team of men working six hours so greatly increased their efficiency that they were able to turn out very nearly as great a product in six hours as they had formerly done in eight.

From the men's point of view, the experiment was not entirely satisfactory, for on a piecework basis their earnings were not quite as great as before. After the new hammer was installed, they went back to the eight-hour schedule. The experiment did show, however, that at least in that kind of work the maximum of human efficiency is to be expected in a working day somewhere between six and eight hours in length.

JOSEPH & FEISS CO.'S CLOTH CRAFT SHOPS, CLEVELAND, OHIO.[1]

At the Cloth Craft Shops of the Joseph & Feiss Co. in Cleveland, the standard working day is eight hours, and the weekly hours up to January, 1917, were 44. At that time the management proposed to the employees that the shop shut down on Saturday altogether, and that the four hours formerly worked on Saturday be distributed through the other five days of the week. The idea was based on the known fact that the employees—or at any rate the girls, who are in the majority—frequently do housework in addition to their work in the factory, and are, consequently, under an added physical

[1] From the Survey (New York) for Feb. 2, 1918, p. 495.

strain. Some, even if they have no general housework to do, make their own clothes or do their own laundry work. It was believed under the circumstances that two full days of freedom from the factory would react favorably on individual efficiency in the shop.

The result has more than justified the expectation. It was not long before the workers were accomplishing as much in five days as they formerly did in five and one-half, and doing it within the eight-hour limit, too. Advantage can now be taken of the week-end as never before. Some of the employees go to the country on Friday night and return refreshed and invigorated late Sunday afternoon.

CASE FOR THE SHORTER WORKDAY.

The brief in the case of Bunting *v.* The State of Oregon, in the Supreme Court of the United States in 1915, is an exposition of the experience with the shorter workday. The following pages are a summary of that brief.

GENERAL SUMMARY.

Certain health hazards in modern industry require the shortening of the hours of work. The speeding up of modern industry, the monotony of machine operation, the unnatural stimulus of piecework constitute the strain of modern industry. Bad air, humidity, extremes of temperature, noise of machinery, exposure to dust, gas, fumes, and poisons are all elements which indicate a need for lengthening the hours of rest.

Fatigue is a chemical process, and an overtired person is literally a person poisoned by his own waste products. Work performed after fatigue has set in increases the hazards to health. Hence there is need to shorten hours of labor in order that the worker may maintain himself in a state of full efficiency.

Additional reasons for limiting the hours of labor are the increased danger of accident arising from the effects of fatigue, general loss of moral restraint and increase of intemperance due to the same cause. Finally family and community life are sacrificed by excessive hours of labor. Neither leisure nor energy are left to the worker of long hours to share in the family and community life.

On the other hand, shorter hours of labor bring physical and moral benefits, strengthen the growth of temperance, provide a margin of leisure and recreation, which are real tests of an advancing civilization, raises the general standards of living, with a consequent benefit to society and a greater inclination on the part of the worker, because of increased periods of leisure, to take advantage of opportunities for self-improvement and legitimate enjoyment. The welfare and safety of democracy rest upon the character and intelligence of its citizens, and for the development of morals and intelligence leisure is necessary; hence it is essential to limit hours of labor in order that the worker may not be too exhausted to enjoy and make use of that leisure.

Shortening the hours of labor is in the interest of the more rapid Americanization of the immigrant. The "whole program of Americanization is impossible unless sufficient leisure is provided after working hours to enable the workers to take advantage of the opportunities offered."

The only protection to the worker lies in the shorter work day because "industries not intrinsically dangerous and conducted under good sanitary conditions may become harmful through sheer lengthening of the working hours. Even the lightest work becomes totally exhausting when carried on for excessive length of time."

The universal experience of those manufacturing countries which have the longest and the short working day indicates that commercial prosperity is not hampered by the curtailment of hours, but, on the contrary, the increased efficiency of the workers, due to shorter working hours, together with general improvement of industrial communities in physique and morals, reacts favorably upon output. An abundance of testimony, covering experience in the United States, tends to show that shorter hours heighten efficiency, which springs from improved physical health and energy, together with a change of attitude toward work and employers. The curtailment of hours acts as a stimulus to heightened efficiency on the part of employers, leading them to lessen or eliminate "lost time" by securing a steadier flow of work and materials through the factory.

In view of the impression held by some that the short working day has tended to increase the cost of production, two facts may be stated: First, the labor cost is only one item, and often a small item, in the total cost of manufacture; and, second, heightened efficiency of both employers and workers under shorter hours stimulates output and thus tends to equalize or even decrease the total costs.

Short hours bear a definite and favorable relation to wages, which tends to show that wages in industries in which the short work day has been established are almost universally higher than they are in wholly unregulated trades. "Moreover, even when the shorter day has resulted in a slight temporary decrease in wages, the majority of workers have willingly suffered the reduction, in order to gain the increased health and leisure consequent upon shorter hours of labor."

Regularity of employment is another benefit derived from shorter hours, for "in place of alternating periods of intense overwork and periods of idleness, employers have found it possible to distribute work more evenly throughout the year." Considerable statistical evidence is available showing that in certain important manufacturing industries a trend toward shorter hours of labor is manifest, and the spread of the tendency to reduce hours in the United States during 1915 is indictaed by reference to the many establishments which have inaugurated the eight-hour day.

MENACES TO NATIONAL VITALITY.

The stress and strain of modern industry contain menaces to the vitality of the Nation. These menaces are observed in an increase in the so-called degenerative diseases of the heart, blood vessels, and kidneys, in cancer, and in the apparently weakened power of resistance to such diseases in the middle aged. This increase is not confined to any particular occupation, but is confined to the middle years of life, the period of greatest industrial activity. While the death rate of children and young persons is being cut down, the rate

for those who have reached middle life is increasing unduly; the difference is not improbably due to the greater strain and stress of modern life, including under that term, hours of labor, environment, dust, fumes, and vapors produced by the work and lowering resistance to disease.

The authorities can not be mentioned in detail. It suffices to quote from a few of the more prominent.

Mr. F. L. Hoffman, statistician of the Prudential Life Insurance Co., in a study of mortality statistics of four leading cities from 1815 to 1914 notes the increase of mortality from heart disease from 103.7 in 100,000 of population (1864–1888) to 164.6 (1889–1913); from nephritis, from 78.7 to 131.7—in the four leading cities of New York, Boston, Philadelphia, and New Orleans.

Dr. L. I. Dublin, statistician of the Metropolitan Life Insurance Co., presents statistics to show an increase in death from cancer between 1900 and 1910 of 30.6 per cent; from diabetes, of 60 per cent; organic diseases of the heart, 39.3 per cent; disease of the arteries, 396.2 per cent. The factors contributing to middle age mortality "are the effects upon the body of the habits and conditions of work."

"It requires no very extensive investigation," Mr. Hoffman also states, "however, to establish the fact that a very considerable amount of the prevailing sickness is strictly preventable and due in a large measure to unhygienic conditions of factory life or trades generally."

An analysis of the general mortality statistics for the registration area of the United States as presented by the Federal Bureau of the Census shows the following for the year 1909:

MORTALITY AMONG OCCUPIED MALES.

	Those in agricultural pursuits (of all deaths).	Those in 131 trades and callings (of all deaths).
	Per cent.	*Per cent.*
Deaths from preventable causes (6.7 are diseases)	27.4	43.0
Deaths from degenerative diseases (under 70 years of age)	26.5	31.0
Total deaths after 70 years of age	35.9	13.4

DANGER OF LONG HOURS.

Recent investigations show that not only in dangerous trades but also in all industries a permanent predisposition to disease and premature death exist in the common phenomenon of fatigue and ex-

haustion. Says Dr. Kober, in Bulletin 75 of the Bureau of Labor Statistics on Industrial Hygiene:

> One of the predisposing causes to disease is overwork or fatigue; * * * statistics of the morbidity and mortality of various occupations * * * indicate that persons habitually engaged in hard work are more frequently subject to disease and present a higher mortality rate than persons more favorably situated; * * * that industrial workers pay a heavy tribute to the so-called "white plague" * * *. "A typical succession of events is first fatigue, then colds, then tuberculosis, then death. Prevention to be effective must begin at the beginning." (Bulletin of the Committee of One Hundred on National Health, Washington, 1909, p. 47.) "Industrial insurance companies," states Dr. Rubinow, formerly statistician of the Ocean Accident and Life Insurance Co., "show a very much higher mortality rate than ordinary insurance companies."

Overfatigue predisposes to the infections as well as to general disease. "It has been shown experimentally," states Dr. Kober (p. 79), "that of two groups of animals, the one resting and the other fatigued by muscular work and both inoculated by pathogenic bacteria, the fatigued animals * * * succumb to the disease in larger numbers."

Fatigue predisposes workers to nervous diseases. The Federal Public Health Service finds that nervous affections, particularly neurasthenia, are common among garment workers.

Employers also testify to the injurious effect of long hours upon general health. William B. Dickson, former vice president of the United States Steel Corporation, states: "In my judgment a large proportion of the steel workers, who from early manhood, work 12 hours a day, are old men at 40." In the rules of its pension department the American Steel & Wire Co. provides that "no inexperienced person over 35 years of age and no experienced person over 45 years of age shall hereafter be taken into the employ of the company." This rule may be suspended in the case of professional services. This shows that the company had expectation of physical deterioration on the part of mill workers at an age when professional men are considered capable of discharging their duties.

HEALTH HAZARDS IN MODERN INDUSTRY.

It is hardly necessary to cite the authorities who have pointed out the new and varying forms of hazards which are features of modern industry. It should suffice to mention the well-known dangers, characteristic of industrial life. These are not matters of statistical tabulation, but of common observation. Machinery is increasingly speeded up, the number of machines tended by in-

dividual workers grows larger, processes become more complex, and more operations are performed simultaneously by the workman. Says Mr. Dublin, statistician of the Metropolitan Life Insurance Co.: "The unceasing whirl of high-speed machinery, the persistent noises of the shop and the necessary nervous accommodation to the rapid movements of the machines result after long period of time, in distinct psychoses," which in turn "may result ultimately in distinct lesions of the heart and kidneys." Declares the New York Bureau of Labor Statistics: "Even the 10-hour day * * * has now become too long a period of work on account of the increasing intensity of application."

Monotony in industrial processes is growing, and is greatly intensified by the piecework system. "I have in my clinical experience," says Dr. Schwab of St. Louis University, "sufficient evidence, * * * to suggest that the piecework system is in some instances a very direct cause in the production of a neurasthenic condition in the worker" in the garment industry, while another doctor characterizes it as "one of the frequent factors in the production of excessive industrial fatigue," and states that "its evils are most potent when combined with long hours."

Injurious physical surroundings constitute a hazard in some industries. These include bad air, humidity, extremes of heat and cold, noise, bad lighting, vibration, etc. Each of these hazards is not confined to any particular dangerous trade; any one or even all may be found in so-called nonhazardous trades, as for example, cotton spinning. Workers in cotton manufacturing are exposed to the danger of inhaling dust and fluff; they are subject to heat and humidity, great noise, lack of ventilation, vibration of machinery, and nauseating odors. A recent report of the Public Health Service notes that "these conditions are so obviously causing disease and are so prevalent in many industries and causing so much direct injury to the workers that the general public have come to consider these as the full extent of the damages for which industrial conditions are responsible."

NATURE AND EFFECTS OF FATIGUE.

The new and accepted theory regarding fatigue is that it is a chemical process, the natural result of bodily and mental exhaustion becoming abnormal when excessive or resulting in exhaustion.

The onset of fatigue may be thus described:

Two processes are continually carried on in the living body: assimilation or building up; disassimilation or breaking down material into simpler chemical

form, ultimately expelled as waste products. Upon these two processes together, known as metabolism, life itself depends and to this fundamental basis of life we must turn for an explanation of what fatigue is.

During activity, the products of chemical change increase. An overtired person is literally a poisoned person, poisoned by his own waste products. These wastes are poisonous impurities arising from the chemical processes of cellular life. They circulate in the blood, poisoning brain and nervous system, muscles, glands, and other organs until normally burned up by the oxygen brought by the blood, removed by the liver or kidneys, or eliminated through the lungs.

When these waste products accumulate in the blood, fatigue ensues. When they exceed their physiological or normal amount, exhaustion results and health is impaired. After excessive labor there is also a consumption of energy-yielding material, essential for activity. The processes of disassimilation are in excess of those of assimilation.

The need of limiting excessive hours of work is also emphasized by recent medical research, which asserts that fatigue is due not only to actual poisoning but to a specific poison or toxin of fatigue. When this fatigue toxin is injected into animals in large amounts it even causes death.

In order to repair the energy expended as a result of muscular and nervous fatigue, rest is absolutely essential. When an individual has worked to exhaustion through excessive hours of labor normal rest does not suffice for repair. He has literally "used himself up."

Emphasis is laid upon the need of limiting excessive working hours because of the increased danger from accidents arising from the different effects of fatigue.

BAD EFFECTS OF LONG HOURS UPON MORALS.

As early as 1850 a special committee on the limitation of hours of work in Massachusetts declared that "excessive labor not only debilitates the body, and thereby exposes it to disease, but also tends to exhaust the mental powers and thus expose the whole moral and intellectual character to undue and dangerous depression."

When the working day is so long that no time is left for a minimum of leisure and recreation, relief from the strain of work is often sought in alcoholic stimulants. Among industrial workers the desire for drink is often due to the physical incidents of factory work, such as exposure to extreme heat, or the inhalation of dust or fluff in the many trades involving such hazards. Intemperance often results also from the worker's craving for some stimulant or support for exhausted energies.

It seems hardly necessary to quote extended authority in support of these assertions, so obvious do they seem. However, John Fitch, in writing of the steel workers in 1910, notes that the only men whom he found in a state of intoxication when looked for at their homes were blast furnace men, "men

who had been working for months without a holiday or a Sunday." The Bureau of Labor Statistics of New York declared in 1900 that "excessive work and long hours are the causes that have powerfully promoted the use of stimulants and intoxicating liquors."

Dr. Nathan Schwartz, of the New York Department of Labor, notes (September, 1915) that workers naturally and inevitably resort to liquors to overcome the sense of drowsiness which becomes chronic with excessive fatigue.

BAD EFFECT OF LONG HOURS ON GENERAL WELFARE.

What it means in an economic sense to preserve the health of the citizen on the part of the State may be set forth in the following facts presented in a study by Mr. Hoffman of the mortality from consumption in the dusty trades for the Federal Bureau of Labor Statistics (1908):

Since the average age at death of persons 15 years of age or over dying from consumption in the registration area of the United States is 37.4 years and probably not much more than 32 years for persons employed in strictly dusty trades, and since the normal average age at death in the mortality from all causes for persons 15 years of age or over is 52.8 years, there would be an average expected gain of at least 15.4 years of life for every death from consumption avoided by rational conditions of industrial life. Such a gain would represent a total of 342,465 years of additional lifetime, and by just so much the industrial efficiency of the American nation would be increased. If we place the economic value or net result of a year's lifetime at only $200, the total average economic gain to the Nation would be $3,080 for every avoidable death of a wage earner from consumption, representing the enormous total of $68,493,000 as the aggregate annual value in the probable saving in years of adult human life. With such results clearly within the range of practical attainment, nothing within reason should be left undone as a national, State, and individual or social duty to prevent that needless, but now enormous, loss of human life from consumption due to unfavorable conditions in American industry.

Not only, therefore, is there an economic loss to society in shortening the life of its industrial workers, but there is also a social loss. Family life, essential to the welfare of the Nation, is destroyed. This must necessarily react disastrously upon the community as well as upon the individual, for the deterioration of any large portion of the population inevitably lowers the entire community physically, mentally, and morally. One of the largest paper manufacturers in America, Mr. Charles Sumner Bird, declares that long hours of labor are intolerable, and, in many ways, "as dangerous to the welfare of the Nation as was the slavery of the black race; the men employed for such long hours are taxed beyond their strength and the physical exhaustion, day after day, week after week, soon results in a lower standard of life. No time or energy is left for the development of the healthy home life essential to the welfare of the Nation."

BENEFITS OF SHORTER HOURS.

Abundant evidence is presented to show the benefits of the shorter work day in reducing intemperance; in raising the standard of living; and allowing play to leisure and recreation. Prof. Taussig, now chairman of the Tariff Commission, wrote in 1904:

> Shorter hours of work are a natural and beneficent outcome of the forces of civilization. The great mass of men need not only an increase in income but an increase of leisure—leisure for rest, for play, for education, for happier and higher living. No doubt leisure is sometimes abused; but in the main it is a needed means of raising the sum of happiness. Therefore, the short-hour movement should have the sympathy of every friend of humanity.

The greater opportunities for self-improvement and legitimate enjoyment are evidenced in the rapid increase of large expenditures for public recreation and of new opportunities for popular education, evening lectures in connection with the public-school system, and extension classes of the large universities. This is emphasized by Marcus M. Marks, president National Association of Clothing Manufacturers:

> There is another consideration which prompts the demand on the part of labor for a shorter work day; it is the greater desire for self-improvement. This has been encouraged by the advance in the public school of the system which affects our younger workmen in particular; also by the multiplication of popular free lectures, public libraries, cheap books and newspapers, etc., that have awakened in the workmen's minds the ambition to lead a better life, possibly only in the enjoyment of a reasonable amount of leisure

BENEFIT TO CITIZENSHIP AND MILITARY STRENGTH.

Not merely is leisure necessary that the workmen may take an increased enjoyment from life, it is essential to his mental and moral equipment as a citizen of the United States. Leisure becomes, therefore, a prime requisite for good citizenship. Hence it is to the interests of the State that individual labor should be limited, first, that leisure may be provided, outside of working hours; second, that workers shall not be too exhausted to make use of this leisure. "By a reasonable conserving in the strength of the working population today may we be assured of a healthy, intelligent productive citizenship in the future," are the words of the committee of stockholders of the United States Steel Corporation. This interest of the State in added leisure for good citizenship finds immediate and forceful application in the Americanization of the foreign born who come to this country to be Americanized—that is, give them opportunity for acquiring

the ability to speak the English language and to become acquainted with American institutions.

Ignorance of the English language is the greatest obstacle to industrial advancement. It prevents the distribution of congested immigrant populations. It increases the dangers of industrial accidents, injuries, and occupational diseases, owing to the immigrant's inability to understand orders or hygienic regulations printed or orally given in industrial establishments. * * * This whole program of Americanization is impossible unless sufficient leisure is provided after working hours to enable the workers to take advantage of the opportunities offered. The task of teaching adult foreigners a new language is rendered almost hopeless unless they can come to be taught with some freshness of mind. The project of Americanization is defeated when working hours are so long that no evening leisure is left or the immigrant workers are too much exhausted to make use of it.

The State is dependent upon the quality of its citizens not only for its development in times of peace, but in the last resort for military defense. Former Secretary of War George W. Alger cites statistics showing that in 1916 in the United States Marine Corps only one applicant out of 11 examined was accepted as fit, and that in New York City about 3 per cent of the 11,012 men making applications, were found fit for service. He continues as follows:

The notion that preparedness is a mere military thing * * * is a delusion. * * * Sweatshops, child labor, industrial anarchy held in check by martial law, the exploitation of the worker * * * all these and a hundred others are true problems of preparedness which are to-day ignored.

SHORTER HOURS THE ONLY POSSIBLE PROTECTION.

The policy of shorter hours is the only protection to the worker, because "industries not intrinsically dangerous and conducted under good sanitary conditions may become harmful through sheer lengthening of the working hours. Even the lightest work becomes totally exhausting when carried on for excessive length of time," and a decrease of the intensity of exertion in industry is not believed to be feasible. "It is certain that any program for reducing this intensity of exertion must fail," stated the Industrial Commission of 1900.

ECONOMIC ASPECT OF REDUCING HOURS.

The Industrial Commission of 1900 was able to state that those industries where the highest wages and fewest hours prevail are those in which the United States excels in marketing its products in foreign markets. Hence, it can not be said that commercial prosperity is hampered by the curtailment of hours. The increased efficiency of the workers due to shorter working hours reacts favorably upon output and heightens rather than impairs prosperity. The commission

continues: "A further reduction in hours will increase the efficiency of this labor and raise its intelligence."

Equally significant as is the benefit to commercial prosperity is the effect of reduced hours of labor upon production. While an abundance of evidence to this effect is found in the industrial experience of foreign countries, it is the testimony of those manufacturers in the United States who have reduced the work day that it reacts favorably upon output. This effect has been found to be true in the United States in the steel industry as well as in cotton manufacturing where the experiment of the shorter work day was first tried, in shoe manufacturing and flour milling, in woolen mills, in commercial establishments, in Government ship construction work, and in granite cutting. The experience in the steel industry may be cited at some length.

The Commonwealth Steel Co., Granite City, Ill., furnishes one of the few instances in this country in which an 8-hour shift has been substituted for a 12-hour shift.

1. The open-hearth department of the Commonwealth Steel Co. consists of four 25-ton basic open-hearth furnaces, three of which only are operated at any one time, and which directly require for their operation 22 men for two 12-hour shifts, or 33 men for three 8-hour shifts. The plant, as a whole, employs 2,300 workmen.

2. The system was changed on February 5, 1912, from a 12-hour, 2-shift, system six days a week, to three shifts of eight hours each.

3. The number of men on each shift (11 men) remained unchanged in the open-hearth department, while in the boiler room only 10 men were employed on the three 8-hour shifts in place of 8 men on the two 12-hour shifts.

4. An increase in the hourly rates for the men employed ranges from 14 to 22 per cent, averaging about 20 per cent.

5. Under the new arrangement, there was a slight decrease in the cost of production, owing to the higher efficiency under the 8-hour system, in spite of the increase in the hourly rates and the number of men employed.

6. Reductions in the amount of extra pig iron charged and in the amount of fuel oil consumed obtained under the new system. These reductions were almost enough to pay for the additional labor employed.

7. Also more accurate results were obtained in the quality of the castings. The physical and chemical specifications were more accurate under the 8-hour system and the percentage of cracked castings was decidedly decreased.

8. The workmen were satisfied with the change, although their earnings were about 20 per cent less under the 8-hour system as compared with the 12-hour system.

The situation is summed up with the following sentence from volume 3 of the steel report (1910) of the Bureau of Labor Statistics:

> The trial of the 8-hour system in the steel foundry shows that the chief immediate results are secured through the fact that the men work together better and give much closer attention to their work when working eight hours than when working 12 hours a day.

The experience of Ballard & Ballard, of Louisville, Ky., flour millers, is that their men turn out the same quantity and quality of output in 8 hours per day as they formerly did in 12 hours; "in dollars and cents—the change has been a profitable investment."

The experience with the reduced hours of labor has been of significance in the coal mining industry of the United States. The Industrial Commission of 1900 noted its occurrence in the bituminous coal mining industry as "the most important instance in recent years of the adopton of the 8-hour working day." The commission continued as follows:

> There is a general agreement that the fewer hours in the coal mines have increased the energy of the workmen, and that there has been little or no decrease in the amount of work turned out during the day. The men are stimulated "to do a good, honest eight hours" work; the foremen do not find them asleep, as they used to, or lounging around or smoking.

During the two years 1895 and 1896, under the 10-hour system, the average output per working man per day in bituminous mining was 2.9 and 2.72 tons; while in 1897, during the latter three months of which the 8-hour day prevailed, the corresponding output per man was 3.03 tons per day; and for 1898, 1899 and 1900 during three years of the 8-hour day, the average output ranged from 2.98 to 3.09 tons. "Each year of the 8-hour day shows for the country as a whole a larger output per day for each workman than the highest output of the 10-hour day."

This increased productivity of workers under shorter hours of labor is due to heightened efficiency. This efficiency arises from improved physical health and energy, from a change of attitude toward work and employer. There is greater promptness in starting in the morning and at noon, more interest and application on the part of the workers and the elimination of "soldiering" and lost time.

Secretary of Commerce Redfield stated in 1914 that "long years ago, before the agitation for the reduction to the 9-hour day, my

associate in business came to the conclusion that there was what he called 'a tired hour,' that it would be, in his judgment, undesirable and unprofitable to continue running the factory as long as it was then run." Instead of reducing their output by one-tenth, Mr. Redfield's company found that it had increased its output more than one-tenth. Mr. William B. Sixon, former vice president of the United States Steel Corporation, believes that "the advantages to be derived from more efficient, because less exhausted, workmen, will, to a great extent offset whatever additional cost may be involved."

Not only is the efficiency of the worker increased by the introduction of the shorter working day, but it has heightened the efficiency on the part of employers. Management of industry has been improved by a new scrutiny of methods in organization and manufacture. In order to maintain output under shorter hours, improved machinery and new processes of manufacture have been invented. The Industrial Commission of 1900 notes "that the shortening of the working day in the mines has strengthened the motive to greater economy of time and better use of machinery and labor-saving devices." The Wisconsin Bureau of Labor and Industrial Statistics states that the enforcing of a certain standard in regard to hours of labor, wages, and sanitary conditions compels employers continually to seek more improved machinery and methods of production.

RELATION OF SHORT HOURS TO COST OF PRODUCTION.

The introduction of a shorter work day has not in the long run led to an increase in the cost of production, first, because the labor cost is only one item and often a small item in the total cost of manufacturing, and second, because of the heightened efficiency of both employers and workers under shorter hours as already pointed out. This has been the experience in the paper, woolen, and cotton industries as revealed by the investigation of the United States Tariff Board; also in the paper mills and probably also in the iron and steel industries, as investigated by the Bureau of Labor Statistics. In the paper and pulp industry, former Chief Statistician N. I. Stone, of the United States Tariff Board, states that it was found "that the mills paying the lowest wages and having a 12-hour day had a higher labor cost per ton of paper than those paying the highest rates of wages and having an 8-hour day."

In the iron and steel industry the Bureau of Labor Statistics disclosed after a careful investigation that a change from the 12-hour to the 8-hour system would mean an increase of 2.6 per cent in the

total cost of production per ton in blast-furnace products. This estimate is, however, made on the assumption that efficiency would not be affected by the change. It also rests on the assumption that each workman in continuous process earned the same amount for eight hours' work that he received for 12 hours. If it were assumed that the workman would accept 10 hours' pay for eight hours' work, the increase of the total cost of production per ton would be only 1.3 per cent.

The following table is presented to show the estimated increases in rates of wages per hour, cost of production, and selling price necessary to introduce the eight-hour system in the blast furnaces, steel works, and rolling mills, on the basis that each workman in continuous processes earned the same amount for 8 hours' work that he now receives for 10 hours and that productive efficiency was unchanged.

	Amount under 12-hour system.	Amount under 8-hour system.	Required amount.	Increase, per cent.
Average hourly earnings	$0.22	$0.26	$0.04	$17.4
Labor cost of production per ton	4.22	4.95	.73	17.4
Total cost of production per ton	24.79	25.52	.73	3.0
Average selling price per ton	34.24	35.27	1.03	3.0

LONG HOURS REDUCES EFFICIENCY.

While shortening the hours of labor does not decrease output, nor materially increase the cost of production, long hours on the other hand, reduced efficiency and result in inferior output. Overfatigue results in spoiled work, and it is generally found that the output in last hours shows a steady and marked decline.

SHORTER HOURS IN RELATION TO WAGES AND REGULARITY OF EMPLOYMENT.

There is no evidence to show that reduction in the hours of labor has meant a decrease in wages. On the contrary, all the evidence tends to establish the fact that wages are higher in industries where the short work day prevails, higher than in wholly unregulated trades. A movement for the reduction of hours in machine trades late in 1915 was accompanied by no reduction in wages. In many cases there were increases in wages.

Wherever hours of labor have been shortened employment has tended to greater regularity. Commons and Andrews in a recent

volume on the Principles of Labor Legislation emphasize this fact as follows:

> Shorter hours likewise tend to steady employment. When no restrictions are placed on hours of work in a seasonal industry, the tendency is to concentrate the work in brief, busy season with long hours of overtime. Hour regulation except in the case of perishable products and those subject to change in fashion, forces a more even distribution of the work over a longer period. When the women's eight-hour law was in force in Illinois factories inspectors noted "a greater uniformity of work and rest" as one of its results.

The investigation of the iron and steel industry by the United States Bureau of Labor Statistics in 1910 called attention to the large amount of overtime work and irregularity of operation in the industry, an irregularity greater than that of any of the larger manufacturing industries whose demand is not seasonal. Both the overtime work and irregularity of operation are the result of running at top speed and under the heaviest pressure while there is an active demand for the particular products of any mill. The writers of the report of the bureau note in this connection that "Some of the best managers assert that the losses from these causes more than counterbalance the gains secured during the months of rush work, and they are confident that they could make a better showing in economy of production for the year as a whole if the mills were operated regularly at a moderate pace."

PROGRESS OF THE SHORTER DAY.

During the latter part of 1915 and the first of 1916 the machine trades of the United States made a notable gain in shorter hours of labor. This movement in the reduction of hours affected mainly firms having contracts for the making of war munitions. The eight-hour day was also established among the clothing manufacturers of Chicago and in the shops of the Victor Talking Machine Co. Other industries have felt the reflex movement of shorter hours.

INSTANCES OF EXCESSIVE HOURS OF LABOR.

While there has been a trend toward shorter hours in some important lines of industry, other industries are still operating 12 hours a day or more.

The investigation of the United States Bureau of Labor Statistics showed that in 1910, 63 per cent of 31,000 men employed in blast furnaces worked 84 hours and over per week; that is, a 12-hour day in a seven-day week. Nearly 43 per cent of 173,000 employees in the iron and steel industry were employed at least 72 hours per week.

CONCLUSION.

Secretary of Commerce Redfield in emphasizing the State's need to preserve health, preventing the loss of human energy due to excessive working hours, states, that "The cry for shorter hours of labor * * * is a normal protest against the fatigue that destroys."

The way to crime and chaos lies plainly in the exploitation of our men and our women as if they were coal or oil. In our free America there is to be industrial and social freedom. Out of the ferment of unrest there has already begun to come a truer sense of human values; a better adjustment of law to those values; a keener conscience as to the treatment of those values, and a conservation which shall not stop with saving water or wood, but will make its greatest and most fruitful task the conserving of our people themselves * * *.

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